



1/120

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SEQUENCE LISTING

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<120> NOVEL STREPTOCOCCUS ANTIGENS

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 Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr
 65 70 75 80
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 100 105 110
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 Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys
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Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr	
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aat ctt caa tat act gta gaa gtc aaa aac ggt agt tta atc ata cct	1968
Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro	
645 650 655	
cat tat gac cat tac cat aac atc aaa ttt gag tgg ttt gac gaa ggc	2016
His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly	
660 665 670	
ctt tat gag gca cct aag ggg tat act ctt gag gat ctt ttg gcg act	2064
Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr	
675 680 685	
gtc aag tac tat gtc gaa cat cca aac gaa cgt ccg cat tca gat aat	2112
Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn	
690 695 700	
ggg ttt ggt aac gct agc gac cat gtt caa aga aac aaa aat ggt caa	2160
Gly Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln	
705 710 715 720	
gct gat acc aat caa acg gaa aaa cca agc gag gag aaa cct cag aca	2208
Ala Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr	
725 730 735	
gaa aaa cct gag gaa gaa acc cct cga gaa gag aaa cca caa agc gag	2256
Glu Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu	
740 745 750	
aaa cca gag tct cca aaa cca aca gag gaa cca gaa gaa gaa tca cca	2304
Lys Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro	
755 760 765	
gag gaa tca gaa gaa cct cag gtc gag act gaa aag gtt gaa gaa aaa	2352
Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys	
770 775 780	
ctg aga gag gct gaa gat tta ctt gga aaa atc cag gat cca att atc	2400
Leu Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile	
785 790 795 800	
aag tcc aat gcc aaa gag act ctc aca gga tta aaa aat aat tta cta	2448
Lys Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu	
805 810 815	

ttt ggc acc cag gac aac aat act att atg gca gaa gct gaa aaa cta 2496
 Phe Gly Thr Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu
 820 825 830

ttg gct tta tta aag gag agt aag taa 2523
 Leu Ala Leu Leu Lys Glu Ser Lys
 835 840

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 <212> PRT
 <213> S. pneumoniae

<400> 4
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 Lys Glu Asn Asn Arg Val Ser Tyr Ile Asp Gly Lys Gln Ala Thr Gln
 35 40 45
 Lys Thr Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile
 50 55 60
 Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr
 65 70 75 80
 Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp
 85 90 95
 Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu
 100 105 110
 Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys
 115 120 125
 Val Asn Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp
 130 135 140
 Asn Val Arg Thr Lys Glu Ile Asn Arg Gln Lys Gln Glu His Ser
 145 150 155 160
 Gln His Arg Glu Gly Thr Ser Ala Asn Asp Gly Ala Val Ala Phe
 165 170 175
 Ala Arg Ser Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn
 180 185 190
 Ala Ser Asp Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His
 195 200 205
 Gly Asp His Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu
 210 215 220
 Leu Ala Ala Ala Glu Ala Phe Leu Ser Gly Arg Glu Asn Leu Ser Asn
 225 230 235 240
 Leu Arg Thr Tyr Arg Arg Gln Asn Ser Asp Asn Thr Pro Arg Thr Asn
 245 250 255
 Trp Val Pro Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser
 260 265 270
 Asn Asn Ser Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp
 275 280 285
 Ser Leu Leu Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val
 290 295 300
 Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr
 305 310 315 320
 Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro
 325 330 335

Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro
			340					345					350		
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu
		355					360					365			
Pro	Ser	Pro	Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala
		370					375					380			
Pro	Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val
385					390					395					400
Lys	Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn
			405					410					415		
Gly	Val	Ser	Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala	Glu	Thr	Ala
			420					425					430		
Ala	Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys
		435					440					445			
Leu	Gly	Ala	Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr
		450				455					460				
Asn	Lys	Ala	Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp
465					470					475					480
Asn	Lys	Gly	Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu
			485					490					495		
Arg	Leu	Lys	Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile
			500					505					510		
Leu	Ala	Phe	Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro
		515					520					525			
Asn	Ala	Gln	Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu
		530				535					540				
Ala	Gly	Lys	Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp
545					550					555					560
Ile	Thr	Ser	Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His
			565						570					575	
Ser	His	Trp	Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala
			580					585					590		
Ala	Gln	Ala	Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp
		595					600					605			
His	Gln	Asp	Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr
		610				615					620				
Asn	Arg	Val	Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr
625					630					635					640
Asn	Leu	Gln	Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro
			645						650					655	
His	Tyr	Asp	His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly
			660					665					670		
Leu	Tyr	Glu	Ala	Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr
		675					680					685			
Val	L														

Leu Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile
 785 790 795 800
 Lys Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu
 805 810 815
 Phe Gly Thr Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu
 820 825 830
 Leu Ala Leu Leu Lys Glu Ser Lys
 835 840

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 <213> S. pneumoniae

<220>
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tat tcc att cgt aaa ttt agt gta gga gta gct agc gta gct gtt gcc	96
Tyr Ser Ile Arg Lys Phe Ser Val Gly Val Ala Ser Val Ala Val Ala	
20 25 30	
agt ctt ttt atg gga agt gtt gta cat gcg aca gag aaa gag gga agt	144
Ser Leu Phe Met Gly Ser Val Val His Ala Thr Glu Lys Glu Gly Ser	
35 40 45	
acc caa gca gcc act tct ttt aat agg gga aat gga agt cag gca gaa	192
Thr Gln Ala Ala Thr Ser Phe Asn Arg Gly Asn Gly Ser Gln Ala Glu	
50 55 60	
caa cgt gga gaa ctc gat tta gaa cga gat aag gca atg aaa gcg gtc	240
Gln Arg Gly Glu Leu Asp Leu Glu Arg Asp Lys Ala Met Lys Ala Val	
65 70 75 80	
agt gaa tat gta gga aaa atg gtg aga gat gcc tat gta aaa tca gat	288
Ser Glu Tyr Val Gly Lys Met Val Arg Asp Ala Tyr Val Lys Ser Asp	
85 90 95	
aga aaa cga cat aaa aat act gta gct cta gtt aac cag ttg gga aac	336
Arg Lys Arg His Lys Asn Thr Val Ala Leu Val Asn Gln Leu Gly Asn	
100 105 110	
att aag aac agg tat ttg aat gaa ata gtt cat tca acc tca aaa agc	384
Ile Lys Asn Arg Tyr Leu Asn Glu Ile Val His Ser Thr Ser Lys Ser	
115 120 125	
caa cta cag gaa ctg atg atg aag agt caa tca gaa gta gat gaa gct	432
Gln Leu Gln Glu Leu Met Met Lys Ser Gln Ser Glu Val Asp Glu Ala	
130 135 140	

gtg tct aaa ttt gaa aag gac tca ttt tct tcg tca agt tca gga tcc	480
Val Ser Lys Phe Glu Lys Asp Ser Phe Ser Ser Ser Ser Gly Ser	
145 150 155 160	
tcc act aaa cca gaa act ccg cag ccg gaa aat cca gag cat caa aaa	528
Ser Thr Lys Pro Glu Thr Pro Gln Pro Glu Asn Pro Glu His Gln Lys	
165 170 175	
cca aca act cca tct ccg gat acc aaa cca agc cct caa cca gaa ggc	576
Pro Thr Thr Pro Ser Pro Asp Thr Lys Pro Ser Pro Gln Pro Glu Gly	
180 185 190	
aag aaa cca agc gta cca gac att aat cag gaa aaa gaa aaa gct aag	624
Lys Lys Pro Ser Val Pro Asp Ile Asn Gln Glu Lys Glu Lys Ala Lys	
195 200 205	
ctt gct gta gta acc tac atg agc aag att tta gat gat ata caa aaa	672
Leu Ala Val Val Thr Tyr Met Ser Lys Ile Leu Asp Asp Ile Gln Lys	
210 215 220	
cat cat ctg cag aaa gaa aaa cat cgt cag att gtt gct ctt att aag	720
His His Leu Gln Lys Glu Lys His Arg Gln Ile Val Ala Leu Ile Lys	
225 230 235 240	
gag ctt gat gag ctt aaa aag caa gct ctt tct gaa att gat aat gta	768
Glu Leu Asp Glu Leu Lys Lys Gln Ala Leu Ser Glu Ile Asp Asn Val	
245 250 255	
aat acc aaa gta gaa att gaa aat aca gtc cac aag ata ttt gca gac	816
Asn Thr Lys Val Glu Ile Glu Asn Thr Val His Lys Ile Phe Ala Asp	
260 265 270	
atg gat gca gtt gtg act aaa ttc aaa aaa ggc tta act cag gac aca	864
Met Asp Ala Val Val Thr Lys Phe Lys Lys Gly Leu Thr Gln Asp Thr	
275 280 285	
cca aaa gaa cca ggt aac aaa aaa cca tct gct cca aaa cca ggt atg	912
Pro Lys Glu Pro Gly Asn Lys Lys Pro Ser Ala Pro Lys Pro Gly Met	
290 295 300	
caa cca agt cct caa cca gag gtt aaa ccg cag ctg gaa aaa cca aaa	960
Gln Pro Ser Pro Gln Pro Glu Val Lys Pro Gln Leu Glu Lys Pro Lys	
305 310 315 320	
cca gag gtt aaa ccg caa cca gaa aaa cca aaa cca gag gtt aaa ccg	1008
Pro Glu Val Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu Val Lys Pro	
325 330 335	
cag ccg gaa aaa cca aaa cca gag gtt aaa ccg cag ccg gaa aaa cca	1056
Gln Pro Glu Lys Pro Lys Pro Glu Val Lys Pro Gln Pro Glu Lys Pro	
340 345 350	
aaa cca gag gtt aaa ccg cag ccg gaa aaa cca aaa cca gag gtt aaa	1104
Lys Pro Glu Val Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu Val Lys	
355 360 365	

ccg cag ccg gaa aaa cca aaa cca gag gtt aaa ccg cag ccg gaa aaa	1152
Pro Gln Pro Glu Lys Pro Lys Pro Glu Val Lys Pro Gln Pro Glu Lys	
370 375 380	
cca aaa cca gag gtt aaa ccg cag ccg gaa aaa cca aaa cca gag gtt	1200
Pro Lys Pro Glu Val Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu Val	
385 390 395 400	
aaa ccg cag ccg gaa aaa cca aaa cca gag gtt aaa ccg cag ccg gaa	1248
Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu Val Lys Pro Gln Pro Glu	
405 410 415	
aaa cca aaa cca gag gtt aaa ccg cag ccg gaa aaa cca aaa cca gag	1296
Lys Pro Lys Pro Glu Val Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu	
420 425 430	
gtt aaa ccg caa cca gaa aaa cca aaa cca gag gtt aaa ccg caa cca	1344
Val Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu Val Lys Pro Gln Pro	
435 440 445	
gaa aaa cca aaa cca gat aat agc aag cca caa gca gat gat aag aag	1392
Glu Lys Pro Lys Pro Asp Asn Ser Lys Pro Gln Ala Asp Asp Lys Lys	
450 455 460	
cca tca act aca aat aat tta agc aag gac aag caa cct tct aac caa	1440
Pro Ser Thr Thr Asn Asn Leu Ser Lys Asp Lys Gln Pro Ser Asn Gln	
465 470 475 480	
gct tca aca aac gaa aaa gca aca aat aaa ccg aag aag tca ttg cca	1488
Ala Ser Thr Asn Glu Lys Ala Thr Asn Lys Pro Lys Lys Ser Leu Pro	
485 490 495	
tca act gga tct att tca aat cta gca ctt gaa att gca ggt ctt ctt	1536
Ser Thr Gly Ser Ile Ser Asn Leu Ala Leu Glu Ile Ala Gly Leu Leu	
500 505 510	
acc ttg gcg ggg gca acc att ctt gct aag aaa aga atg aaa	1578
Thr Leu Ala Gly Ala Thr Ile Leu Ala Lys Lys Arg Met Lys	
515 520 525	

tag	1581
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 <212> PRT
 <213> S. pneumoniae

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			20					25					30		
Ser	Leu	Phe	Met	Gly	Ser	Val	Val	His	Ala	Thr	Glu	Lys	Glu	Gly	Ser
		35					40					45			
Thr	Gln	Ala	Ala	Thr	Ser	Phe	Asn	Arg	Gly	Asn	Gly	Ser	Gln	Ala	Glu
		50				55					60				

Gln	Arg	Gly	Glu	Leu	Asp	Leu	Glu	Arg	Asp	Lys	Ala	Met	Lys	Ala	Val
65					70					75					80
Ser	Glu	Tyr	Val	Gly	Lys	Met	Val	Arg	Asp	Ala	Tyr	Val	Lys	Ser	Asp
				85					90					95	
Arg	Lys	Arg	His	Lys	Asn	Thr	Val	Ala	Leu	Val	Asn	Gln	Leu	Gly	Asn
			100					105					110		
Ile	Lys	Asn	Arg	Tyr	Leu	Asn	Glu	Ile	Val	His	Ser	Thr	Ser	Lys	Ser
		115					120					125			
Gln	Leu	Gln	Glu	Leu	Met	Met	Lys	Ser	Gln	Ser	Glu	Val	Asp	Glu	Ala
	130					135					140				
Val	Ser	Lys	Phe	Glu	Lys	Asp	Ser	Phe	Ser	Ser	Ser	Ser	Ser	Gly	Ser
145					150					155					160
Ser	Thr	Lys	Pro	Glu	Thr	Pro	Gln	Pro	Glu	Asn	Pro	Glu	His	Gln	Lys
				165					170					175	
Pro	Thr	Thr	Pro	Ser	Pro	Asp	Thr	Lys	Pro	Ser	Pro	Gln	Pro	Glu	Gly
			180					185					190		
Lys	Lys	Pro	Ser	Val	Pro	Asp	Ile	Asn	Gln	Glu	Lys	Glu	Lys	Ala	Lys
		195					200					205			
Leu	Ala	Val	Val	Thr	Tyr	Met	Ser	Lys	Ile	Leu	Asp	Asp	Ile	Gln	Lys
	210					215					220				
His	His	Leu	Gln	Lys	Glu	Lys	His	Arg	Gln	Ile	Val	Ala	Leu	Ile	Lys
225					230					235					240
Glu	Leu	Asp	Glu	Leu	Lys	Lys	Gln	Ala	Leu	Ser	Glu	Ile	Asp	Asn	Val
				245					250					255	
Asn	Thr	Lys	Val	Glu	Ile	Glu	Asn	Thr	Val	His	Lys	Ile	Phe	Ala	Asp
			260					265					270		
Met	Asp	Ala	Val	Val	Thr	Lys	Phe	Lys	Lys	Gly	Leu	Thr	Gln	Asp	Thr
	275						280					285			
Pro	Lys	Glu	Pro	Gly	Asn	Lys	Lys	Pro	Ser	Ala	Pro	Lys	Pro	Gly	Met
	290				295					300					
Gln	Pro	Ser	Pro	Gln	Pro	Glu	Val	Lys	Pro	Gln	Leu	Glu	Lys	Pro	Lys
305				310						315					320
Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro
			325						330					335	
Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro
		340					345					350			
Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys
	355					360						365			
Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys
	370					375					380				
Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val
385				390						395					400
Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu
			405						410				415		
Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu
		420						425				430			
Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro
		435					440					445			
Glu	Lys	Pro	Lys	Pro	Asp	Asn	Ser	Lys	Pro	Gln	Ala	Asp	Asp	Lys	Lys
	450					455					460				
Pro	Ser	Thr	Thr	Asn	Asn	Leu	Ser	Lys	Asp	Lys	Gln	Pro	Ser	Asn	Gln
465				470						475					480
Ala	Ser	Thr	Asn	Glu	Lys	Ala	Thr	Asn	Lys	Pro	Lys	Lys	Ser	Leu	Pro
			485						490					495	
Ser	Thr	Gly	Ser	Ile	Ser	Asn	Leu	Ala	Leu	Glu	Ile	Ala	Gly	Leu	Leu
			500					505					510		

Thr Leu Ala Gly Ala Thr Ile Leu Ala Lys Lys Arg Met Lys
 515 520 525

<210> 7
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 <212> DNA
 <213> *S. pneumoniae*

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tcc ttg agt cta tgt gcc tat gca cta aac cag cat cgt tcg cag gaa	96
Ser Leu Ser Leu Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu	
20 25 30	
aat aag gac aat aat cgt gtc tct tat gtg gat ggc agc cag tca agt	144
Asn Lys Asp Asn Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser	
35 40 45	
cag aaa agt gaa aac ttg aca cca gac cag gtt agc cag aaa gaa gga	192
Gln Lys Ser Glu Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly	
50 55 60	
att cag gct gag caa att gta atc aaa att aca gat cag ggc tat gta	240
Ile Gln Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val	
65 70 75 80	
acg tca cac ggt gac cac tat cat tac tat aat ggg aaa gtt cct tat	288
Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr	
85 90 95	
gat gcc ctc ttt agt gaa gaa ctc ttg atg aag gat cca aac tat caa	336
Asp Ala Leu Phe Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln	
100 105 110	
ctt aaa gac gct gat att gtc aat gaa gtc aag ggt ggt tat atc atc	384
Leu Lys Asp Ala Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile	
115 120 125	
aag gtc gat gga aaa tat tat gtc tac ctg aaa gat gca gct cat gct	432
Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala	
130 135 140	
gat aat gtt cga act aaa gat gaa atc aat cgt caa aaa caa gaa cat	480
Asp Asn Val Arg Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His	
145 150 155 160	
gtc aaa gat aat gag aag gtt aac tct aat gtt gct gta gca agg tct	528
Val Lys Asp Asn Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser	
165 170 175	

cag gga cga tat acg aca aat gat ggt tat gtc ttt aat cca gct gat	576
Gln Gly Arg Tyr Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp	
180 185 190	
att atc gaa gat acg ggt aat gct tat atc gtt cct cat gga ggt cac	624
Ile Ile Glu Asp Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His	
195 200 205	
tat cac tac att ccc aaa agc gat tta tct gct agt gaa tta gca gca	672
Tyr His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala	
210 215 220	
gct aaa gca cat ctg gct gga aaa aat atg caa ccg agt cag tta agc	720
Ala Lys Ala His Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser	
225 230 235 240	
tat tct tca aca gct agt gac aat aac acg caa tct gta gca aaa gga	768
Tyr Ser Ser Thr Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly	
245 250 255	
tca act agc aag cca gca aat aaa tct gaa aat ctc cag agt ctt ttg	816
Ser Thr Ser Lys Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu	
260 265 270	
aag gaa ctc tat gat tca cct agc gcc caa cgt tac agt gaa tca gat	864
Lys Glu Leu Tyr Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp	
275 280 285	
ggc ctg gtc ttt gac cct gct aag att atc agt cgt aca cca aat gga	912
Gly Leu Val Phe Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly	
290 295 300	
gtt gcg att ccg cat ggc gac cat tac cac ttt att cct tac agc aag	960
Val Ala Ile Pro His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys	
305 310 315 320	
ctt tct gct tta gaa gaa aag att gcc aga atg gtg cct atc agt gga	1008
Leu Ser Ala Leu Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly	
325 330 335	
act ggt tct aca gtt tct aca aat gca aaa cct aat gaa gta gtg tct	1056
Thr Gly Ser Thr Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser	
340 345 350	
agt cta ggc agt ctt tca agc aat cct tct tct tta acg aca agt aag	1104
Ser Leu Gly Ser Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys	
355 360 365	
gag ctc tct tca gca tct gat ggt tat att ttt aat cca aaa gat atc	1152
Glu Leu Ser Ser Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile	
370 375 380	
gtt gaa gaa acg gct aca gct tat att gta aga cat ggt gat cat ttc	1200
Val Glu Glu Thr Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe	
385 390 395 400	

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His Tyr Ile Pro Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn	
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Asn Ser Leu Ala Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr	
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Ser His Glu Lys His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg	
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Ile Ile Ala Glu Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His	
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Ile Ile Glu Asp Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His	
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48

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96

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Tyr Thr Gly Glu Glu Leu Thr Asn Val Val Asn Leu Leu Lys Asn Ser	
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Thr Phe Asn Asn Gln Asn Phe Thr Leu Ala Asn Gly Gln Lys Arg Val	
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gagaggctga agatttactt ggaaaaatcc aggatccaat tatcaagtcc aatgccaaag 2460
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Met
1

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aaa atc aat aaa aaa tat cta gca ggt tca gtg gca gtc ctt gcc cta 164
Lys Ile Asn Lys Lys Tyr Leu Ala Gly Ser Val Ala Val Leu Ala Leu
5 10 15

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agt gtt tgt tcc tat gaa ctt ggt cgt cac caa gct ggt cag gtt aag 212
Ser Val Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Val Lys
20 25 30

```

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aaa gag tct aat cga gtt tct tat ata gat ggt gat cag gct ggt caa 260
Lys Glu Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln
35 40 45

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aag gca gaa aat ttg aca cca gat gaa gtc agt aag aga gag ggg atc 308
Lys Ala Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile
50 55 60 65

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aac gcc gaa caa att gtt atc aag att acg gat caa ggt tat gtg acc 356
Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr
70 75 80

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tct cat gga gac cat tat cat tac tat aat ggc aag gtt cct tat gat 404
Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp
85 90 95

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gcc atc atc agt gaa gaa ctt ctc atg aaa gat ccg aat tat cag ttg 452
Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu
100 105 110

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aag gat tca gac att gtc aat gaa atc aag ggt ggc tat gtg att aag 500
Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys
115 120 125

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gta gac gga aaa tac tat gtt tac ctt aaa gat gcg gcc cat gcg gac 548
Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp
130 135 140 145

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aat att cgg aca aaa gaa gag att aaa cgt cag aag cag gaa cac agt	596
Asn Ile Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser	
150 155 160	
cat aat cat aac tca aga gca gat aat gct gtt gct gca gcc aga gcc	644
His Asn His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg Ala	
165 170 175	
caa gga cgt tat aca acg gat gat ggg tat atc ttc aat gca tct gat	692
Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp	
180 185 190	
atc att gag gac acg ggt gat gct tat atc gtt cct cac ggc gac cat	740
Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His	
195 200 205	
tac cat tac att cct aag aat gag tta tca gct agc gag tta gct gct	788
Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala	
210 215 220 225	
gca gaa gcc tat tgg aat ggg aag cag gga tct cgt cct tct tca agt	836
Ala Glu Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser	
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Ser Ser Tyr Asn Ala Asn Pro Val Gln Pro Arg Leu Ser Glu Asn His	
245 250 255	
aat ctg act gtc act cca act tat cat caa aat caa ggg gaa aac att	932
Asn Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile	
260 265 270	
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Ser Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His	
275 280 285	
gta gaa tct gat ggc ctt att ttc gac cca gcg caa atc aca agt cga	1028
Val Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg	
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acc gcc aga ggt gta gct gtc cct cat ggt aac cat tac cac ttt atc	1076
Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile	
310 315 320	
cct tat gaa caa atg tct gaa ttg gaa aaa cga att gct cgt att att	1124
Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile	
325 330 335	
ccc ctt cgt tat cgt tca aac cat tgg gta cca gat tca aga cca gaa	1172
Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu	
340 345 350	
caa cca agt cca caa tcg act ccg gaa cct agt cca agt ctg caa cct	1220
Gln Pro Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln Pro	
355 360 365	

gca cca aat cct caa cca gct cca agc aat cca att gat gag aaa ttg	1268
Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu	
370 375 380 385	
gtc aaa gaa gct gtt cga aaa gta ggc gat ggt tat gtc ttt gag gag	1316
Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu	
390 395 400	
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Asn Gly Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr	
405 410 415	
gca gca ggc att gat agc aaa ctg gcc aag cag gaa agt tta tct cat	1412
Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His	
420 425 430	
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Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe	
435 440 445	
tac aat aag gct tat gac tta cta gca aga att cac caa gat tta ctt	1508
Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu	
450 455 460 465	
gat aat aaa ggt cga caa gtt gat ttt gag gtt ttg gat aac ctg ttg	1556
Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp Asn Leu Leu	
470 475 480	
gaa cga ctc aag gat gtc tca agt gat aaa gtc aag tta gtg gat gat	1604
Glu Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp	
485 490 495	
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Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys	
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cca aat gcg caa att acc tac act gat gat gag att caa gta gcc aag	1700
Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys	
515 520 525	
ttg gca ggc aag tac aca aca gaa gac ggt tat atc ttt gat cct cgt	1748
Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg	
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gat ata acc agt gat gag ggg gat gcc tat gta act cca cat atg acc	1796
Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr	
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cat agc cac tgg att aaa aaa gat agt ttg tct gaa gct gag aga gcg	1844
His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala	
565 570 575	
gca gcc cag gct tat gct aaa gag aaa ggt ttg acc cct cct tcg aca	1892
Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr	
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tac aat ctt caa tat act gta gaa gtc aaa aac ggt agt tta atc ata Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile 630 635 640	2036
cct cat tat gac cat tac cat aac atc aaa ttt gag tgg ttt gac gaa Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu 645 650 655	2084
ggc ctt tat gag gca cct aag ggg tat agt ctt gag gat ctt ttg gcg Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala 660 665 670	2132
act gtc aag tac tat gtc gaa cat cca aac gaa cgt ccg cat tca gat Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp 675 680 685	2180
aat ggt ttt ggt aac gct agt gac cat gtt cgt aaa aat aag gca gac Asn Gly Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp 690 695 700 705	2228
caa gat agt aaa cct gat gaa gat aag gaa cat gat gaa gta agt gag Gln Asp Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser Glu 710 715 720	2276
cca act cac cct gaa tct gat gaa aaa gag aat cac gct ggt tta aat Pro Thr His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn 725 730 735	2324
cct tca gca gat aat ctt tat aaa cca agc act gat acg gaa gag aca Pro Ser Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr 740 745 750	2372
gag gaa gaa gct gaa gat acc aca gat gag gct gaa att cct caa gta Glu Glu Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val 755 760 765	2420
gag aat tct gtt att aac gct aag ata gca gat gcg gag gcc ttg cta Glu Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu 770 775 780 785	2468
gaa aaa gta aca gat cct agt att aga caa aat gct atg gag aca ttg Glu Lys Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu 790 795 800	2516
act ggt cta aaa agt agt ctt ctt ctc gga acg aaa gat aat aac act Thr Gly Leu Lys Ser Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr 805 810 815	2564

att tca gca gaa gta gat agt ctc ttg gct ttg tta aaa gaa agt caa 2612
 Ile Ser Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln
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ccg gct cct ata cag tagtaaaatg aa 2639
 Pro Ala Pro Ile Gln
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 35 40 45
 Gln Lys Ala Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly
 50 55 60
 Ile Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val
 65 70 75 80
 Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr
 85 90 95
 Asp Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln
 100 105 110
 Leu Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile
 115 120 125
 Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala
 130 135 140
 Asp Asn Ile Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His
 145 150 155 160
 Ser His Asn His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg
 165 170 175
 Ala Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser
 180 185 190
 Asp Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp
 195 200 205
 His Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala
 210 215 220
 Ala Ala Glu Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser
 225 230 235 240
 Ser Ser Ser Tyr Asn Ala Asn Pro Val Gln Pro Arg Leu Ser Glu Asn
 245 250 255
 His Asn Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn
 260 265 270
 Ile Ser Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg
 275 280 285
 His Val Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser
 290 295 300
 Arg Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe
 305 310 315 320
 Ile Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile
 325 330 335

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Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro
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Glu Gln Pro Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln
      355                      360                      365
Pro Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys
      370                      375                      380
Leu Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu
385                      390                      395                      400
Glu Asn Gly Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu
      405                      410                      415
Thr Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser
      420                      425                      430
His Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu
      435                      440                      445
Phe Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu
      450                      455                      460
Leu Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp Asn Leu
465                      470                      475                      480
Leu Glu Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp
      485                      490                      495
Asp Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly
      500                      505                      510
Lys Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala
      515                      520                      525
Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro
      530                      535                      540
Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met
545                      550                      555                      560
Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg
      565                      570                      575
Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser
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Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala
      595                      600                      605
Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met
      610                      615                      620
Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile
625                      630                      635                      640
Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp
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Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu
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Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser
      675                      680                      685
Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Ala
      690                      695                      700
Asp Gln Asp Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser
705                      710                      715                      720
Glu Pro Thr His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu
      725                      730                      735
Asn Pro Ser Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu
      740                      745                      750
Thr Glu Glu Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln
      755                      760                      765
Val Glu Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu
      770                      775                      780

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Leu Glu Lys Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr
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 Leu Thr Gly Leu Lys Ser Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn
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 aat cgt gtc tct tat gtg gat ggc agc cag tca agt cag aaa agt gaa 96
 Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu
 20 25 30
 aac ttg aca cca gac cag gtt agc cag aaa gaa gga att cag gct gag 144
 Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
 35 40 45
 caa att gta atc aaa att aca gat cag ggc tat gta acg tca cac ggt 192
 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
 50 55 60
 gat cac tat cat tac tat aat ggg aaa gtt cct tat gat gcc ctc ttt 240
 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
 65 70 75 80
 agt gaa gaa ctc ttg atg aag gat cca aac tat caa ctt aaa gac gct 288
 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
 85 90 95
 gat att gtc aat gaa gtc aag ggt ggt tat atc atc aag gtc gat gga 336
 Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
 100 105 110
 aaa tat tat gtc tac ctg aaa gat gca gct cat gct gat aat gtt cga 384
 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
 115 120 125
 act aaa gat gaa atc aat cgt caa aaa caa gaa cat gtc aaa gat aat 432
 Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
 130 135 140

gag aag gtt aac tct aat gtt gct gta gca agg tct cag gga cga tat	480
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr	
145 150 155 160	
acg aca aat gat ggt tat gtc ttt aat cca gct gat att atc gaa gat	528
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp	
165 170 175	
acg ggt aat gct tat atc gtt cct cat gga ggt cac tat cac tac att	576
Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile	
180 185 190	
ccc aaa agc gat tta tct gct agt gaa tta gca gca gct aaa gca cat	624
Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His	
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ctg gct gga aaa aat atg caa ccg agt cag tta agc tat tct tca aca	672
Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr	
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Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr Ser His Glu Lys His	
225 230 235 240	
gaa gaa gat gga tac gga ttt gat gct aat cgt att atc gct gaa gat	768
Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg Ile Ile Ala Glu Asp	
245 250 255	
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Glu Ser Gly Phe Val Met Ser His Gly Asp His Asn His Tyr Phe Phe	
260 265 270	
aag aag gac ttg aca gaa gag caa att aag gct gcg caa aaa cat tta	864
Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His Leu	
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Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His	
290 295 300	
gaa cag gat tat cca agt aat gcc aaa gaa atg aaa gat tta gat aaa	960
Glu Gln Asp Tyr Pro Ser Asn Ala Lys Glu Met Lys Asp Leu Asp Lys	
305 310 315 320	
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Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys	
325 330 335	
cgt gaa agt att gtc gtg aat aaa gaa aaa aat gcg att att tat ccg	1056
Arg Glu Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr Pro	
340 345 350	
cat gga gat cac cat cat gca gat ccg att gat gaa cat aaa ccg gtt	1104
His Gly Asp His His His Ala Asp Pro Ile Asp Glu His Lys Pro Val	
355 360 365	

gga att ggt cat tct cac agt aac tat gaa ctg ttt aaa ccc gaa gaa	1152
Gly Ile Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu Glu	
370 375 380	
gga gtt gct aaa aaa gaa ggg aat aaa gtt tat act gga gaa gaa tta	1200
Gly Val Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu Leu	
385 390 395 400	
acg aat gtt gtt aat ttg tta aaa aat agt acg ttt aat aat caa aac	1248
Thr Asn Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln Asn	
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ttt act cta gcc aat ggt caa aaa cgc gtt tct ttt agt ttt ccg cct	1296
Phe Thr Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro Pro	
420 425 430	
gaa ttg gag aaa aaa tta ggt atc aat atg cta gta aaa tta ata aca	1344
Glu Leu Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile Thr	
435 440 445	
cca gat gga aaa gta ttg gag aaa gta tct ggt aaa gta ttt gga gaa	1392
Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly Glu	
450 455 460	
gga gta ggg aat att gca aac ttt gaa tta gat caa cct tat tta cca	1440
Gly Val Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu Pro	
465 470 475 480	
gga caa aca ttt aag tat act atc gct tca aaa gat tat cca gaa gta	1488
Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu Val	
485 490 495	
agt tat gat ggt aca ttt aca gtt cca acc tct tta gct tac aaa atg	1536
Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys Met	
500 505 510	
gcc agt caa acg att ttc tat cct ttc cat gca ggg gat act tat tta	1584
Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr Leu	
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Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu Val	
530 535 540	
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Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn Tyr	
545 550 555 560	
aaa gtt ggt gaa atc aaa tta ccg att ccg aaa tta aac caa gga aca	1728
Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly Thr	
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Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn Ala	
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Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu Glu	
595 600 605	
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Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys Arg	
610 615 620	
aat aaa gca caa gaa aac tca aaa ctt gat gaa aag gta gaa gaa cca	1920
Asn Lys Ala Gln Glu Asn Ser Lys Leu Asp Glu Lys Val Glu Glu Pro	
625 630 635 640	
aag act agt gag aag gta gaa aaa gaa aaa ctt tct gaa act ggg aat	1968
Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly Asn	
645 650 655	
agt act agt aat tca acg tta gaa gaa gtt cct aca gtg gat cct gta	2016
Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro Val	
660 665 670	
caa gaa aaa gta gca aaa ttt gct gaa agt tat ggg atg aag cta gaa	2064
Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu Glu	
675 680 685	
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Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro Ser	
690 695 700	
gga gaa gtc att aaa aag aat atg gca gat ttt aca gga gaa gca cct	2160
Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala Pro	
705 710 715 720	
caa gga aat ggt gaa aat aaa cca tct gaa aat gga aaa gta tct act	2208
Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser Thr	
725 730 735	
gga aca gtt gag aac caa cca aca gaa aat aaa cca gca gat tct tta	2256
Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser Leu	
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Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr Asp	
755 760 765	
aat gga atg ttg aat cca gaa ggg aat gtg ggg agt gac cct atg tta	2352
Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met Leu	
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Asp Ser Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu Lys	
785 790 795 800	
tta gaa aaa ttt aca gct agt tac gga tta ggc tta gat agt gtt ata	2448
Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val Ile	
805 810 815	

ttc aat atg gat gga acg att gaa tta aga ttg cca agt gga gaa gtg 2496
 Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu Val
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 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
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 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
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 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
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 Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
 100 105 110
 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
 115 120 125
 Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
 130 135 140
 Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
 145 150 155 160
 Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
 165 170 175
 Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile
 180 185 190
 Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His
 195 200 205
 Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr
 210 215 220
 Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr Ser His Glu Lys His
 225 230 235 240
 Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg Ile Ile Ala Glu Asp
 245 250 255
 Glu Ser Gly Phe Val Met Ser His Gly Asp His Asn His Tyr Phe Phe
 260 265 270
 Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His Leu
 275 280 285
 Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His
 290 295 300
 Glu Gln Asp Tyr Pro Ser Asn Ala Lys Glu Met Lys Asp Leu Asp Lys
 305 310 315 320
 Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys
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Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln	Asn
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Asn	Val	Leu	Phe	Asn											

Asp	Ser	Ala	Leu	Glu	Glu	Ala	Pro	Ala	Val	Asp	Pro	Val	Gln	Glu	Lys
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Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Arg	Leu	Pro	Ser	Gly	Glu	Val
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			485					490						495				
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val			
		500						505					510					
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr			
	515						520					525						
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro			
	530					535					540							
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu			
545					550					555					560			
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu			
			565					570						575				
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln			
		580						585					590					
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro			
	595					600						605						
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile			
	610					615					620							

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Thr Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly
625                      630                      635                      640
Glu Gly Val Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu
                      645                      650                      655
Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu
                      660                      665                      670
Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
                      675                      680                      685
Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr
690                      695                      700
Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu
705                      710                      715                      720
Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn
                      725                      730                      735
Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
                      740                      745                      750
Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn
755                      760                      765
Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu
770                      775                      780
Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
785                      790                      795                      800
Arg Asn Lys Ala Gln Glu Asn Ser Lys Leu Asp Glu Lys Val Glu Glu
                      805                      810                      815
Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly
                      820                      825                      830
Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro
835                      840                      845
Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu
850                      855                      860
Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro
865                      870                      875                      880
Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
                      885                      890                      895
Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser
900                      905                      910
Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
915                      920                      925
Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
930                      935                      940
Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
945                      950                      955                      960
Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu
                      965                      970                      975
Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
980                      985                      990
Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu
995                      1000                      1005
Val Ile Lys Lys Asn Leu Ser Asp Phe Ile Ala
1010                      1015

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<210> 56
<211> 489
<212> PRT
<213> S. pneumoniae

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<400> 56

Cys	Ala	Tyr	Ala	Leu	Asn	Gln	His	Arg	Ser	Gln	Glu	Asn	Lys	Asp	Asn	1	5	10	15
Asn	Arg	Val	Ser	Tyr	Val	Asp	Gly	Ser	Gln	Ser	Ser	Gln	Lys	Ser	Glu	20	25	30	
Asn	Leu	Thr	Pro	Asp	Gln	Val	Ser	Gln	Lys	Glu	Gly	Ile	Gln	Ala	Glu	35	40	45	
Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	Gly	50	55	60	
Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Leu	Phe	65	70	75	80
Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	Ala	85	90	95	
Asp	Ile	Val	Asn	Glu	Val	Lys	Gly	Gly	Tyr	Ile	Ile	Lys	Val	Asp	Gly	100	105	110	
Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg	115	120	125	
Thr	Lys	Asp	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Val	Lys	Asp	Asn	130	135	140	
Glu	Lys	Val	Asn	Ser	Asn	Val	Ala	Val	Ala	Arg	Ser	Gln	Gly	Arg	Tyr	145	150	155	160
Thr	Thr	Asn	Asp	Gly	Tyr	Val	Phe	Asn	Pro	Ala	Asp	Ile	Ile	Glu	Asp	165	170	175	
Thr	Gly	Asn	Ala	Tyr	Ile	Val	Pro	His	Gly	Gly	His	Tyr	His	Tyr	Ile	180	185	190	
Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	Lys	Ala	His	195	200	205	
Leu	Ala	Gly	Lys	Asn	Met	Gln	Pro	Ser	Gln	Leu	Ser	Tyr	Ser	Ser	Thr	210	215	220	
Ala	Ser	Asp	Asn	Asn	Thr	Gln	Ser	Val	Ala	Lys	Gly	Ser	Thr	Ser	Lys	225	230	235	240
Pro	Ala	Asn	Lys	Ser	Glu	Asn	Leu	Gln	Ser	Leu	Leu	Lys	Glu	Leu	Tyr	245	250	255	
Asp	Ser	Pro	Ser	Ala	Gln	Arg	Tyr	Ser	Glu	Ser	Asp	Gly	Leu	Val	Phe	260	265	270	
Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro	275	280	285	
His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	Ser	Lys	Leu	Ser	Ala	Leu	290	295	300	
Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr	305	310	315	320
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser	325	330	335	
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser	340	345	350	
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr	355	360	365	
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro	370	375	380	
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala	385	390	395	400
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys	405	410	415	
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu	420	425	430	
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe	435	440	445	

Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His
 450 455 460
 Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser
 465 470 475 480
 His Glu Gln Asp Tyr Pro Gly Asn Ala
 485

<210> 57
 <211> 509
 <212> PRT
 <213> S. pneumoniae

<400> 57
 Met Lys Phe Ser Lys Lys Tyr Ile Ala Ala Gly Ser Ala Val Ile Val
 1 5 10 15
 Ser Leu Ser Leu Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu
 20 25 30
 Asn Lys Asp Asn Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser
 35 40 45
 Gln Lys Ser Glu Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly
 50 55 60
 Ile Gln Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val
 65 70 75 80
 Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr
 85 90 95
 Asp Ala Leu Phe Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln
 100 105 110
 Leu Lys Asp Ala Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile
 115 120 125
 Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala
 130 135 140
 Asp Asn Val Arg Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His
 145 150 155 160
 Val Lys Asp Asn Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser
 165 170 175
 Gln Gly Arg Tyr Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp
 180 185 190
 Ile Ile Glu Asp Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His
 195 200 205
 Tyr His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala
 210 215 220
 Ala Lys Ala His Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser
 225 230 235 240
 Tyr Ser Ser Thr Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly
 245 250 255
 Ser Thr Ser Lys Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu
 260 265 270
 Lys Glu Leu Tyr Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp
 275 280 285
 Gly Leu Val Phe Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly
 290 295 300
 Val Ala Ile Pro His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys
 305 310 315 320
 Leu Ser Ala Leu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly
 325 330 335
 Thr Gly Ser Thr Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser
 340 345 350

Ser Leu Gly Ser Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys
 355 360 365
 Glu Leu Ser Ser Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile
 370 375 380
 Val Glu Glu Thr Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe
 385 390 395 400
 His Tyr Ile Pro Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn
 405 410 415
 Asn Ser Leu Ala Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr
 420 425 430
 Ser His Glu Lys His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg
 435 440 445
 Ile Ile Ala Glu Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His
 450 455 460
 Asn His Tyr Phe Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala
 465 470 475 480
 Ala Gln Lys His Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp
 485 490 495
 Ser Leu Ser Ser His Glu Gln Asp Tyr Pro Gly Asn Ala
 500 505

<210> 58
 <211> 1057
 <212> PRT
 <213> S. pneumoniae

<400> 58
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 1 5 10 15
 Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His Glu Gln
 20 25 30
 Asp Tyr Pro Gly Asn Ala Lys Glu Met Lys Asp Leu Asp Lys Lys Ile
 35 40 45
 Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys Arg Glu
 50 55 60
 Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr Pro His Gly
 65 70 75 80
 Asp His His His Ala Asp Pro Ile Asp Glu His Lys Pro Val Gly Ile
 85 90 95
 Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu Glu Gly Val
 100 105 110
 Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu Leu Thr Asn
 115 120 125
 Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln Asn Phe Thr
 130 135 140
 Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro Pro Glu Leu
 145 150 155 160
 Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile Thr Pro Asp
 165 170 175
 Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly Glu Gly Val
 180 185 190
 Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu Pro Gly Gln
 195 200 205
 Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu Val Ser Tyr
 210 215 220
 Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys Met Ala Ser
 225 230 235 240

Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr	Leu	Arg	Val
				245					250					255	
Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu	Val	Arg	Val
			260					265					270		
Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn	Tyr	Lys	Val
		275					280					285			
Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly	Thr	Thr	Arg
	290					295					300				
Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn	Ala	Tyr	Leu
305					310					315					320
Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu	Glu	Lys	Glu
				325					330					335	
Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys	Arg	Asn	Lys
			340					345					350		
Ala	Gln	Glu	Asn	Ser	Lys	Leu	Asp	Glu	Lys	Val	Glu	Glu	Pro	Lys	Thr
		355					360					365			
Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly	Asn	Ser	Thr
	370					375					380				
Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val	Pro	Thr	Val	Asp	Pro	Val	Gln	Glu
385					390					395					400
Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu	Glu	Asn	Val
				405					410					415	
Leu	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Tyr	Leu	Pro	Ser	Gly	Glu
			420					425					430		
Val	Ile	Lys	Lys	Asn	Met	Ala	Asp	Phe	Thr	Gly	Glu	Ala	Pro	Gln	Gly
		435					440					445			
Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu	Asn	Gly	Lys	Val	Ser	Thr	Gly	Thr
	450					455					460				
Val	Glu	Asn	Gln	Pro	Thr	Glu	Asn	Lys	Pro	Ala	Asp	Ser	Leu	Pro	Glu
465					470					475					480
Ala	Pro	Asn	Glu	Lys	Pro	Val	Lys	Pro	Glu	Asn	Ser	Thr	Asp	Asn	Gly
				485					490					495	
Met	Leu	Asn	Pro	Glu	Gly	Asn	Val	Gly	Ser	Asp	Pro	Met	Leu	Asp	Pro
			500					505					510		
Ala	Leu	Glu	Glu	Ala	Pro	Ala	Val	Asp	Pro	Val	Gln	Glu	Lys	Leu	Glu
		515					520					525			
Lys	Phe	Thr	Ala	Ser	Tyr	Gly	Leu	Gly	Leu	Asp	Ser	Val	Ile	Phe	Asn
	530					535					540				
Met	Asp	Gly	Thr	Ile	Glu	Leu	Arg	Leu	Pro	Ser	Gly	Glu	Val	Ile	Lys
545					550					555					560
Lys	Asn	Leu	Ser	Asp	Phe	Ile	Ala	Lys	Leu	Arg	Tyr	Arg	Ser	Asn	His
				565					570					575	
Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu	Pro	Ser	Pro	Gln	Pro	Thr	Pro
			580					585					590		
Glu	Pro	Ser	Pro												

Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg Gln Val Asp
 690 695 700
 Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp Val Ser Ser
 705 710 715 720
 Asp Lys Val Lys Leu Val Asp Asp Ile Leu Ala Phe Leu Ala Pro Ile
 725 730 735
 Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ala Gln Ile Thr Tyr Thr
 740 745 750
 Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr Thr Thr Glu
 755 760 765
 Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp Glu Gly Asp
 770 775 780
 Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile Lys Lys Asp
 785 790 795 800
 Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala Tyr Ala Lys Glu
 805 810 815
 Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp Ser Gly Asn Thr
 820 825 830
 Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys Ala Ala Lys
 835 840 845
 Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr Thr Val Glu
 850 855 860
 Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His Tyr His Asn
 865 870 875 880
 Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala Pro Lys Gly
 885 890 895
 Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr Val Glu His
 900 905 910
 Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp
 915 920 925
 His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr Asn Gln Thr Glu
 930 935 940
 Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu Lys Pro Glu Glu Glu Thr
 945 950 955 960
 Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu Ser Pro Lys Pro
 965 970 975
 Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser Glu Glu Pro Gln
 980 985 990
 Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu Ala Glu Asp Leu
 995 1000 1005
 Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys Ser Asn Ala Lys Glu Thr
 1010 1015 1020
 Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr Gln Asp Asn Asn
 1025 1030 1035 1040
 Thr Ile Met Ala Glu Ala Glu Lys Leu Leu Ala Leu Leu Lys Glu Ser
 1045 1050 1055
 Lys

<210> 59
 <211> 205
 <212> PRT
 <213> S. pneumoniae

<400> 59
 Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu Asn Lys Asp Asn
 1 5 10 15

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Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu
      20                      25                      30
Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
      35                      40                      45
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
      50                      55                      60
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
65      70                      75                      80
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
      85                      90                      95
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
      100                     105                     110
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
      115                     120                     125
Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
130      135                     140
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
145      150                     155                     160
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
      165                     170                     175
Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile
      180                     185                     190
Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala
      195                     200                     205

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<210> 60
<211> 821
<212> PRT
<213> S. pneumoniae

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<400> 60
Cys Ala Tyr Glu Leu Gly Leu His Gln Ala Gln Thr Val Lys Glu Asn
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Asn Arg Val Ser Tyr Ile Asp Gly Lys Gln Ala Thr Gln Lys Thr Glu
      20                      25                      30
Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala Glu
      35                      40                      45
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
      50                      55                      60
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile Ile
65      70                      75                      80
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ser
      85                      90                      95
Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn Gly
      100                     105                     110
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
      115                     120                     125
Thr Lys Glu Glu Ile Asn Arg Gln Lys Gln Glu His Ser Gln His Arg
130      135                     140
Glu Gly Gly Thr Ser Ala Asn Asp Gly Ala Val Ala Phe Ala Arg Ser
145      150                     155                     160
Gln Gly Arg Tyr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp
      165                     170                     175
Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His
180      185                     190
Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala
195      200                     205

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Ala	Glu	Ala	Phe	Leu	Ser	Gly	Arg	Glu	Asn	Leu	Ser	Asn	Leu	Arg	Thr	210	215	220
Tyr	Arg	Arg	Gln	Asn	Ser	Asp	Asn	Thr	Pro	Arg	Thr	Asn	Trp	Val	Pro	225	230	235
Ser	Val	Ser	Asn	Pro	Gly	Thr	Thr	Asn	Thr	Asn	Thr	Ser	Asn	Asn	Ser	245	250	255
Asn	Thr	Asn	Ser	Gln	Ala	Ser	Gln	Ser	Asn	Asp	Ile	Asp	Ser	Leu	Leu	260	265	270
Lys	Gln	Leu	Tyr	Lys	Leu	Pro	Leu	Ser	Gln	Arg	His	Val	Glu	Ser	Asp	275	280	285
Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala	Arg	Gly	290	295	300
Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	Tyr	Glu	Gln	305	310	315
Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro	Leu	Arg	Tyr	325	330	335
Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu	Pro	Ser	Pro	340	345	350
Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Pro	Gln	Pro	Ala	Pro	Asn	Pro		355	360	365
Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	370	375	380
Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	385	390	395
Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	405	410	415
Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Ala	420	425	430
Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	435	440	445
Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	450	455	460
Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	465	470	475
Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu	Ala	Phe	485	490	495
Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ala	Gln	500	505	510
Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	515	520	525
Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	530	535	540
Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	545	550	555
Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	565	570	575
Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	580	585	590
Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	595	600	605
Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	610	615	620
Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	625	630	635
His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	645	650	655

Ala	Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr
			660					665					670		
Tyr	Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly	Phe	Gly
		675					680					685			
Asn	Ala	Ser	Asp	His	Val	Gln	Arg	Asn	Lys	Asn	Gly	Gln	Ala	Asp	Thr
	690					695					700				
Asn	Gln	Thr	Glu	Lys	Pro	Ser	Glu	Glu	Lys	Pro	Gln	Thr	Glu	Lys	Pro
705					710					715					720
Glu	Glu	Glu	Thr	Pro	Arg	Glu	Glu	Lys	Pro	Gln	Ser	Glu	Lys	Pro	Glu
			725					730					735		
Ser	Pro	Lys	Pro	Thr	Glu	Glu	Pro	Glu	Glu	Glu	Ser	Pro	Glu	Glu	Ser
			740					745					750		
Glu	Glu	Pro	Gln	Val	Glu	Thr	Glu	Lys	Val	Glu	Glu	Lys	Leu	Arg	Glu
		755					760					765			
Ala	Glu	Asp	Leu	Leu	Gly	Lys	Ile	Gln	Asp	Pro	Ile	Ile	Lys	Ser	Asn
	770					775					780				
Ala	Lys	Glu	Thr	Leu	Thr	Gly	Leu	Lys	Asn	Asn	Leu	Leu	Phe	Gly	Thr
785					790					795					800
Gln	Asp	Asn	Asn	Thr	Ile	Met	Ala	Glu	Ala	Glu	Lys	Leu	Leu	Ala	Leu
				805					810						815
Leu	Lys	Glu	Ser	Lys											
			820												

<210> 61

<211> 334

<212> PRT

<213> S. pneumoniae

<400> 61

Cys	Ala	Tyr	Glu	Leu	Gly	Leu	His	Gln	Ala	Gln	Thr	Val	Lys	Glu	Asn
1				5					10					15	
Asn	Arg	Val	Ser	Tyr	Ile	Asp	Gly	Lys	Gln	Ala	Thr	Gln	Lys	Thr	Glu
		20						25					30		
Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala	Glu
		35					40					45			
Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	Gly
	50					55					60				
Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile	Ile
65					70					75					80
Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	Ser
			85						90					95	
Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn	Gly
			100					105					110		
Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg
		115					120					125			
Thr	Lys	Glu	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Ser	Gln	His	Arg
	130					135					140				
Glu	Gly	Gly	Thr	Ser	Ala	Asn	Asp	Gly	Ala	Val	Ala	Phe	Ala	Arg	Ser
145					150					155					160
Gln	Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp
			165						170					175	
Ile	Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asp	His
		180						185					190		
Tyr	His	Tyr	Ile	Pro	Lys	Asn	Glu	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala
		195					200					205			
Ala	Glu	Ala	Phe	Leu	Ser	Gly	Arg	Glu	Asn	Leu	Ser	Asn	Leu	Arg	Thr
	210					215						220			

Tyr Arg Arg Gln Asn Ser Asp Asn Thr Pro Arg Thr Asn Trp Val Pro
 225 230 235 240
 Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser Asn Asn Ser
 245 250 255
 Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp Ser Leu Leu
 260 265 270
 Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val Glu Ser Asp
 275 280 285
 Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala Arg Gly
 290 295 300
 Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr Glu Gln
 305 310 315 320
 Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro Leu
 325 330

<210> 62

<211> 487

<212> PRT

<213> S. pneumoniae

<400> 62

Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Glu Pro
 1 5 10 15
 Ser Pro Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro Gln Pro Ala Pro
 20 25 30
 Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys
 35 40 45
 Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly
 50 55 60
 Val Ser Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala Glu Thr Ala Ala
 65 70 75 80
 Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu
 85 90 95
 Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn
 100 105 110
 Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn
 115 120 125
 Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg
 130 135 140
 Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu
 145 150 155 160
 Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn
 165 170 175
 Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala
 180 185 190
 Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile
 195 200 205
 Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser
 210 215 220
 His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala
 225 230 235 240
 Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His
 245 250 255
 Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn
 260 265 270
 Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn
 275 280 285

Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His
 290 295 300
 Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu
 305 310 315 320
 Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val
 325 330 335
 Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly
 340 345 350
 Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala
 355 360 365
 Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu
 370 375 380
 Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys
 385 390 395 400
 Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu
 405 410 415
 Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu
 420 425 430
 Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys
 435 440 445
 Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe
 450 455 460
 Gly Thr Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu Leu
 465 470 475 480
 Ala Leu Leu Lys Glu Ser Lys
 485

<210> 63
 <211> 613
 <212> PRT
 <213> S. pneumoniae

<400> 63
 Ala Glu Ala Phe Leu Ser Gly Arg Glu Asn Leu Ser Asn Leu Arg Thr
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 Tyr Arg Arg Gln Asn Ser Asp Asn Thr Pro Arg Thr Asn Trp Val Pro
 20 25 30
 Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser Asn Asn Ser
 35 40 45
 Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp Ser Leu Leu
 50 55 60
 Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val Glu Ser Asp
 65 70 75 80
 Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala Arg Gly
 85 90 95
 Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr Glu Gln
 100 105 110
 Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro Leu Arg Tyr
 115 120 125
 Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Glu Pro Ser Pro
 130 135 140
 Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro Gln Pro Ala Pro Asn Pro
 145 150 155 160
 Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys Glu Ala
 165 170 175
 Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly Val Ser
 180 185 190


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Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala Glu Thr Ala Ala Gly Ile
    195                200                205
Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu Gly Ala
    210                215                220
Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn Lys Ala
    225                230                235                240
Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly
    245                250                255
Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys
    260                265                270
Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu Ala Phe
    275                280                285
Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ala Gln
    290                295                300
Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys
    305                310                315                320
Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser
    325                330                335
Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp
    340                345                350
Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala
    355                360                365
Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp
    370                375                380
Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val
    385                390                395                400
Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln
    405                410                415
Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp
    420                425                430
His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu
    435                440                445
Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr
    450                455                460
Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly
    465                470                475                480
Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr
    485                490                495
Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu Lys Pro
    500                505                510
Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu
    515                520                525
Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser
    530                535                540
Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu
    545                550                555                560
Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys Ser Asn
    565                570                575
Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr
    580                585                590
Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu Leu Ala Leu
    595                600                605
Leu Lys Glu Ser Lys
    610

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<210> 64

<211> 568

<212> PRT

<213> S. pneumoniae

<400> 64

Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His	Leu	Glu	Glu	1	5	10	15
Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser	His	Glu	Gln	20	25	30	
Asp	Tyr	Pro	Gly	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp	Lys	Lys	Ile	35	40	45	
Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val	Lys	Arg	Glu	50	55	60	
Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr	Pro	His	Gly	65	70	75	80
Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro	Val	Gly	Ile	85	90	95	
Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu	Glu	Gly	Val	100	105	110	
Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu	Leu	Thr	Asn	115	120	125	
Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln	Asn	Phe	Thr	130	135	140	
Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro	Pro	Glu	Leu	145	150	155	160
Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile	Thr	Pro	Asp	165	170	175	
Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly	Glu	Gly	Val	180	185	190	
Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu	Pro	Gly	Gln	195	200	205	
Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu	Val	Ser	Tyr	210	215	220	
Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys	Met	Ala	Ser	225	230	235	240
Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr	Leu	Arg	Val	245	250	255	
Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu	Val	Arg	Val	260	265	270	
Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn	Tyr	Lys	Val	275	280	285	
Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly	Thr	Thr	Arg	290	295	300	
Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn	Ala	Tyr	Leu	305	310	315	320
Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu	Glu	Lys	Glu	325	330	335	
Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys	Arg	Asn	Lys	340	345	350	
Ala	Gln	Glu	Asn	Ser	Lys	Leu	Asp	Glu	Lys	Val	Glu	Glu	Pro	Lys	Thr	355	360	365	
Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly	Asn	Ser	Thr	370	375	380	
Ser	Asn	Ser	Thr	Leu	Glu	Val	Pro	Thr	Val	Asp	Pro	Val	Gln	Glu		385	390	395	400
Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu	Glu	Asn	Val	405	410	415	

Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro Ser Gly Glu
 420 425 430
 Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala Pro Gln Gly
 435 440 445
 Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser Thr Gly Thr
 450 455 460
 Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser Leu Pro Glu
 465 470 475 480
 Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr Asp Asn Gly
 485 490 495
 Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met Leu Asp Pro
 500 505 510
 Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu Lys Leu Glu
 515 520 525
 Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val Ile Phe Asn
 530 535 540
 Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu Val Ile Lys
 545 550 555 560
 Lys Asn Leu Ser Asp Phe Ile Ala
 565

<210> 65
 <211> 329
 <212> PRT
 <213> S. pneumoniae

<400> 65
 Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His Leu Glu Glu
 1 5 10 15
 Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His Glu Gln
 20 25 30
 Asp Tyr Pro Gly Asn Ala Lys Glu Met Lys Asp Leu Asp Lys Lys Ile
 35 40 45
 Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys Arg Glu
 50 55 60
 Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr Pro His Gly
 65 70 75 80
 Asp His His His Ala Asp Pro Ile Asp Glu His Lys Pro Val Gly Ile
 85 90 95
 Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu Glu Gly Val
 100 105 110
 Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu Leu Thr Asn
 115 120 125
 Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln Asn Phe Thr
 130 135 140
 Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro Pro Glu Leu
 145 150 155 160
 Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile Thr Pro Asp
 165 170 175
 Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly Glu Gly Val
 180 185 190
 Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu Pro Gly Gln
 195 200 205
 Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu Val Ser Tyr
 210 215 220
 Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys Met Ala Ser
 225 230 235 240

Gln	Thr	Ile	Phe	Tyr 245	Pro	Phe	His	Ala	Gly 250	Asp	Thr	Tyr	Leu	Arg	Val
Asn	Pro	Gln	Phe 260	Ala	Val	Pro	Lys	Gly 265	Thr	Asp	Ala	Leu	Val	Arg	Val
Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr 280	Leu	Glu	Asn	Asn	Tyr	Lys	Val
Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly	Thr	Thr	Arg
Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met 315	Ala	Asn	Ala	Tyr	Leu
Asp	Asn	Gln	Ser	Thr 325	Tyr	Ile	Val	Glu							

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<210> 66
<211> 240
<212> PRT
<213> S. pneumoniae
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<400> 66															
Glu 1	Val	Pro	Ile	Leu 5	Glu	Lys	Glu	Asn	Gln 10	Thr	Asp	Lys	Pro	Ser	Ile 15
Leu	Pro	Gln	Phe 20	Lys	Arg	Asn	Lys	Ala 25	Gln	Glu	Asn	Ser	Lys 30	Leu	Asp
Glu	Lys	Val	Glu	Glu	Pro	Lys	Thr	Ser	Glu	Lys	Val	Glu	Lys 45	Glu	Lys
Leu	Ser	Glu	Thr	Gly	Asn	Ser	Thr	Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val 50
Pro 65	Thr	Val	Asp	Pro	Val	Gln	Glu	Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser 80
Tyr	Gly	Met	Lys	Leu	Glu	Asn	Val	Leu	Phe	Asn	Met	Asp	Gly	Thr	Ile 95
Glu	Leu	Tyr	Leu	Pro	Ser	Gly	Glu	Val	Ile	Lys	Lys	Asn	Met	Ala	Asp 110
Phe	Thr	Gly	Glu	Ala	Pro	Gln	Gly	Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu 125
Asn	Gly	Lys	Val	Ser	Thr	Gly	Thr	Val	Glu	Asn	Gln	Pro	Thr	Glu	Asn 140
Lys 145	Pro	Ala	Asp	Ser	Leu	Pro	Glu	Ala	Pro	Asn	Glu	Lys	Pro	Val	Lys 160
Pro	Glu	Asn	Ser	Thr	Asp	Asn	Gly	Met	Leu	Asn	Pro	Glu	Gly	Asn	Val 175
Gly	Ser	Asp	Pro	Met	Leu	Asp	Pro	Ala	Leu	Glu	Glu	Ala	Pro	Ala	Val 190
Asp	Pro	Val	Gln	Glu	Lys	Leu	Glu	Lys	Phe	Thr	Ala	Ser	Tyr	Gly	Leu 205
Gly	Leu	Asp	Ser	Val	Ile	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Arg 220
Leu 225	Pro	Ser	Gly	Glu	Val	Ile	Lys	Lys	Asn	Leu	Ser	Asp	Phe	Ile	Ala 240

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<210> 67 .
<211> 555
<212> PRT
<213> S. pneumoniae
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<400> 67

Asp	Ile	Asp	Ser	Leu	Leu	Lys	Gln	Leu	Tyr	Lys	Leu	Pro	Leu	Ser	Gln	1	5	10	15
Arg	His	Val	Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	20	25	30	
Ser	Arg	Thr	Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	35	40	45	
Phe	Ile	Pro	Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	50	55	60	
Ile	Ile	Pro	Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	65	70	75	80
Pro	Glu	Glu	Pro	Ser	Pro	Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	85	90	95	
Gln	Pro	Ala	Pro	Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	100	105	110	
Lys	Leu	Val	Lys	Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	115	120	125	
Glu	Glu	Asn	Gly	Val	Ser	Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala	130	135	140	
Glu	Thr	Ala	Ala	Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	145	150	155	160
Ser	His	Lys	Leu	Gly	Ala	Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	165	170	175	
Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	180	185	190	
Leu	Leu	Asp	Asn	Lys	Gly	Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	195	200	205	
Leu	Leu	Glu	Arg	Leu	Lys	Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	210	215	220	
Asp	Asp	Ile	Leu	Ala	Phe	Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	225	230	235	240
Gly	Lys	Pro	Asn	Ala	Gln	Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	245	250	255	
Ala	Lys	Leu	Ala	Gly	Lys	Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	260	265	270	
Pro	Arg	Asp	Ile	Thr	Ser	Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	275	280	285	
Met	Thr	His	Ser	His	Trp	Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	290	295	300	
Arg	Ala	Ala	Ala	Gln	Ala	Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	305	310	315	320
Ser	Thr	Asp	His	Gln	Asp	Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	325	330	335	
Ala	Ile	Tyr	Asn	Arg	Val	Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	340	345	350	
Met	Pro	Tyr	Asn	Leu	Gln	Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	355	360	365	
Ile	Ile	Pro	His	Tyr	Asp	His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	370	375	380	
Asp	Glu	Gly	Leu	Tyr	Glu	Ala	Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	385	390	395	400
Leu	Ala	Thr	Val	Lys	Tyr	Tyr	Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	405	410	415	
Ser	Asp	Asn	Gly	Phe	Gly	Asn	Ala	Ser	Asp	His	Val	Gln	Arg	Asn	Lys	420	425	430	
Asn	Gly	Gln	Ala	Asp	Thr	Asn	Gln	Thr	Glu	Lys	Pro	Ser	Glu	Glu	Lys	435	440	445	

Pro Gln Thr Glu Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro
 450 455 460
 Gln Ser Glu Lys Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu
 465 470 475 480
 Glu Ser Pro Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val
 485 490 495
 Glu Glu Lys Leu Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp
 500 505 510
 Pro Ile Ile Lys Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn
 515 520 525
 Asn Leu Leu Phe Gly Thr Gln Asp Asn Asn Thr Ile Met Ala Glu Ala
 530 535 540
 Glu Lys Leu Leu Ala Leu Leu Lys Glu Ser Lys
 545 550 555

<210> 68
 <211> 428
 <212> PRT
 <213> S. pneumoniae

<400> 68
 Asp Ile Asp Ser Leu Leu Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln
 1 5 10 15
 Arg His Val Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr
 20 25 30
 Ser Arg Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His
 35 40 45
 Phe Ile Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg
 50 55 60
 Ile Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg
 65 70 75 80
 Pro Glu Glu Pro Ser Pro Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro
 85 90 95
 Gln Pro Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu
 100 105 110
 Lys Leu Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe
 115 120 125
 Glu Glu Asn Gly Val Ser Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala
 130 135 140
 Glu Thr Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu
 145 150 155 160
 Ser His Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg
 165 170 175
 Glu Phe Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp
 180 185 190
 Leu Leu Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn
 195 200 205
 Leu Leu Glu Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val
 210 215 220
 Asp Asp Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu
 225 230 235 240
 Gly Lys Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val
 245 250 255
 Ala Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp
 260 265 270
 Pro Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His
 275 280 285

Met Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu
 290 295 300
 Arg Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro
 305 310 315 320
 Ser Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu
 325 330 335
 Ala Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg
 340 345 350
 Met Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu
 355 360 365
 Ile Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe
 370 375 380
 Asp Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu
 385 390 395 400
 Leu Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His
 405 410 415
 Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val
 420 425

<210> 69
 <211> 121
 <212> PRT
 <213> S. pneumoniae

<400> 69
 Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala
 1 5 10 15
 Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp
 20 25 30
 Asn Gly Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly
 35 40 45
 Gln Ala Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln
 50 55 60
 Thr Glu Lys Pro Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser
 65 70 75 80
 Glu Lys Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser
 85 90 95
 Pro Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu
 100 105 110
 Lys Leu Arg Glu Ala Glu Asp Leu Leu
 115 120

<210> 70
 <211> 132
 <212> PRT
 <213> S. pneumoniae

<400> 70
 Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr Asn
 1 5 10 15
 Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu Lys Pro Glu
 20 25 30
 Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu Ser
 35 40 45
 Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser Glu
 50 55 60
 Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu Ala

65				70				75				80			
Glu	Asp	Leu	Leu	Gly	Lys	Ile	Gln	Asp	Pro	Ile	Ile	Lys	Ser	Asn	Ala
				85				90						95	
Lys	Glu	Thr	Leu	Thr	Gly	Leu	Lys	Asn	Asn	Leu	Leu	Phe	Gly	Thr	Gln
			100					105					110		
Asp	Asn	Asn	Thr	Ile	Met	Ala	Glu	Ala	Glu	Lys	Leu	Leu	Ala	Leu	Leu
		115					120						125		
Lys	Glu	Ser	Lys												
	130														

<210> 71
 <211> 226
 <212> PRT
 <213> S. pneumoniae

<400> 71

Asp	Ile	Asp	Ser	Leu	Leu	Lys	Gln	Leu	Tyr	Lys	Leu	Pro	Leu	Ser	Gln
1				5					10					15	
Arg	His	Val	Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr
			20					25					30		
Ser	Arg	Thr	Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His
		35					40					45			
Phe	Ile	Pro	Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg
	50					55					60				
Ile	Ile	Pro	Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg
65					70					75					80
Pro	Glu	Glu	Pro	Ser	Pro	Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro
				85					90					95	
Gln	Pro	Ala	Pro	Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu
			100					105					110		
Lys	Leu	Val	Lys	Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe
		115					120					125			
Glu	Glu	Asn	Gly	Val	Ser	Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala
	130					135					140				
Glu	Thr	Ala	Ala	Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu
145					150					155					160
Ser	His	Lys	Leu	Gly	Ala	Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg
			165						170					175	
Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp
			180					185					190		
Leu	Leu	Asp	Asn	Lys	Gly	Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn
		195					200					205			
Leu	Leu	Glu	Arg	Leu	Lys	Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val
	210					215					220				
Asp	Asp														
225															

<210> 72
 <211> 203
 <212> PRT
 <213> S. pneumoniae

<400> 72

Asp	Ile	Leu	Ala	Phe	Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly
1				5					10					15	
Lys	Pro	Asn	Ala	Gln	Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala
			20					25					30		

Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro
 35 40 45
 Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met
 50 55 60
 Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg
 65 70 75 80
 Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser
 85 90 95
 Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala
 100 105 110
 Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met
 115 120 125
 Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile
 130 135 140
 Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp
 145 150 155 160
 Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu
 165 170 175
 Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser
 180 185 190
 Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val
 195 200

<210> 73
 <211> 819
 <212> PRT
 <213> S. pneumoniae

<400> 73
 Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Val Lys Lys Glu
 1 5 10 15
 Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
 20 25 30
 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
 35 40 45
 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
 50 55 60
 Gly Asp His Tyr His Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
 65 70 75 80
 Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
 85 90 95
 Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp
 100 105 110
 Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
 115 120 125
 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser His Asn
 130 135 140
 His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg Ala Gln Gly
 145 150 155 160
 Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile
 165 170 175
 Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His
 180 185 190
 Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala Ala Glu
 195 200 205
 Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser
 210 215 220

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Tyr Asn Ala Asn Pro Val Gln Pro Arg Leu Ser Glu Asn His Asn Leu
225                230                235                240
Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser Ser
                245                250                255
Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val Glu
                260                265                270
Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala
                275                280                285
Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr
                290                295                300
Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro Leu
305                310                315                320
Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln Pro
                325                330                335
Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln Pro Ala Pro
                340                345                350
Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys
                355                360                365
Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly
                370                375                380
Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala
385                390                395                400
Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu
                405                410                415
Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn
                420                425                430
Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn
                435                440                445
Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp Asn Leu Leu Glu Arg
                450                455                460
Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu
465                470                475                480
Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn
                485                490                495
Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala
                500                505                510
Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile
                515                520                525
Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser
                530                535                540
His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala
545                550                555                560
Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His
                565                570                575
Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn
                580                585                590
Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn
                595                600                605
Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His
                610                615                620
Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu
625                630                635                640
Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr Val
                645                650                655
Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly
                660                665                670

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[illegible]

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<210> 74
<211> 568
<212> PRT
<213> S. pneumoniae
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	<400> 74															
Glu 1	Asn	Ile	Ser	Ser 5	Leu	Leu	Arg	Glu	Leu 10	Tyr	Ala	Lys	Pro	Leu 15	Ser	
Glu	Arg	His	Val	Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	
			20					25					30			
Thr	Ser	Arg	Thr	Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	
			35				40					45				
His	Phe	Ile	Pro	Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	
	50					55					60					
Arg	Ile	Ile	Pro	Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	
65					70					75				80		
Arg	Pro	Glu	Gln	Pro	Ser	Pro	Gln	Ser	Thr	Pro	Glu	Pro	Ser	Pro	Ser	
				85					90					95		
Leu	Gln	Pro	Ala	Pro	Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	
			100					105					110			
Glu	Lys	Leu	Val	Lys	Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	
		115					120					125				
Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg	Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	
	130					135					140					
Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	
145					150					155				160		
Leu	Ser	His	Lys	Leu	Gly	Ala	Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	
				165					170					175		
Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	
			180					185					190			
Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg	Gln	Val	Asp	Phe	Glu	Val	Leu	Asp	
		195					200					205				
Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	
	210					215					220					
Val	Asp	Asp	Ile	Leu	Ala	Phe	Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	
225					230					235					240	

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Leu Gly Lys Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln
      245                      250                      255
Val Ala Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe
      260                      265                      270
Asp Pro Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro
      275                      280                      285
His Met Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala
      290                      295                      300
Glu Arg Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro
      305                      310                      315                      320
Pro Ser Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala
      325                      330                      335
Glu Ala Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp
      340                      345                      350
Arg Met Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser
      355                      360                      365
Leu Ile Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp
      370                      375                      380
Phe Asp Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp
      385                      390                      395                      400
Leu Leu Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro
      405                      410                      415
His Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn
      420                      425                      430
Lys Ala Asp Gln Asp Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu
      435                      440                      445
Val Ser Glu Pro Thr His Pro Glu Ser Asp Glu Lys Glu Asn His Ala
      450                      455                      460
Gly Leu Asn Pro Ser Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr
      465                      470                      475                      480
Glu Glu Thr Glu Glu Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile
      485                      490                      495
Pro Gln Val Glu Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu
      500                      505                      510
Ala Leu Leu Glu Lys Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met
      515                      520                      525
Glu Thr Leu Thr Gly Leu Lys Ser Ser Leu Leu Leu Gly Thr Lys Asp
      530                      535                      540
Asn Asn Thr Ile Ser Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys
      545                      550                      555                      560
Glu Ser Gln Pro Ala Pro Ile Gln
      565

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<210> 75
<211> 140
<212> PRT
<213> S. pneumoniae

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<400> 75
Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro Asp Glu Asp Lys
  1      5      10      15
Glu His Asp Glu Val Ser Glu Pro Thr His Pro Glu Ser Asp Glu Lys
      20      25      30
Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn Leu Tyr Lys Pro
      35      40      45
Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu Asp Thr Thr Asp
      50      55      60

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Glu Ala Glu Ile Pro Gln Val Glu Asn Ser Val Ile Asn Ala Lys Ile
 65 70 75 80
 Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp Pro Ser Ile Arg
 85 90 95
 Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser Ser Leu Leu Leu
 100 105 110
 Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val Asp Ser Leu Leu
 115 120 125
 Ala Leu Leu Lys Glu Ser Gln Pro Ala Pro Ile Gln
 130 135 140

<210> 76
 <211> 3171
 <212> DNA
 <213> *S. pneumoniae*

<400> 76

gacttgacag	aagagcaa	at	taaggctgcg	caaaaacatt	tagaggaagt	taaaactagt	60
cataatggat	tagattcttt	gt	catctcat	gaacaggatt	atccaggtaa	tgccaaagaa	120
atgaaagatt	tagataaaaa	aat	cgaaagaa	aaaattgctg	gcattatgaa	acaatatggt	180
gtcaaacgtg	aaagtattgt	cgt	gaataaaa	gaaaaaaatg	cgattattta	tccgcatgga	240
gatcaccatc	atgcagatcc	gatt	gatgaa	cataaacagg	ttggaattgg	tcattctcac	300
agtaactatg	aactgtttta	accc	gaagaa	ggagttgcta	aaaaagaagg	gaataaagtt	360
tatactggag	aagaattaac	gaat	gttggt	aatttggtta	aaaatagtag	gttttaataat	420
caaaacttta	ctctagccaa	tgg	tcaaaaa	cgcgtttctt	ttagttttcc	gcctgaattg	480
gagaaaaaat	taggtatcaa	tat	gctagta	aaattaataa	caccagatgg	aaaagtattg	540
gagaaagtat	ctggtaaagt	att	tggagaa	ggagtaggga	atattgcaaa	ctttgaatta	600
gatcaacctt	atttaccagg	aca	acattt	aagtatacta	tcgcttcaaa	agattatcca	660
gaagtaagtt	atgatggtac	att	tacagtt	ccaacctctt	tagcttacaa	aatggccagt	720
caaacgattt	tctatccttt	ccat	gcaggg	gatacttatt	taagagtga	ccctcaattt	780
gcagtgccta	aaggaactga	tgct	tttagtc	agagtgtttg	atgaatttca	tggaaatgct	840
tatttagaaa	ataactataa	agtt	ggtgaa	atcaaattac	cgattccgaa	attaaaccaa	900
ggaacaacca	gaacggccgg	aaata	aaaatt	cctgtaacct	tcatggcaaa	tgcttatttg	960
gacaatcaat	cgacttatat	tgt	ggaagta	cctatcttgg	aaaaagaaaa	tcaaactgat	1020
aaaccaagta	ttctaccaca	att	taaaagg	aataaagcac	aagaaaactc	aaaacttgat	1080
gaaaaggtag	aagaaccaa	gact	agtagag	aaggtagaaa	aagaaaaact	ttctgaaact	1140
gggaatagta	ctagtaattc	aac	gttagaa	gaagttccta	cagtggatcc	tgtacaagaa	1200
aaagtagcaa	aatttgctga	aag	ttatggg	atgaagctag	aaaatgtctt	gtttaatatg	1260
gacggaacaa	ttgaattata	ttt	accatca	ggagaagtca	ttaaaaagaa	tatggcagat	1320
tttacaggag	aagcacctca	agg	aatgggt	gaaaataaac	catctgaaaa	tggaaaagta	1380
tctactggaa	cagttgagaa	cca	accaaca	gaaaataaac	cagcagattc	tttaccagag	1440
gcaccaaacg	aaaaacctgt	aaa	accagaa	aactcaacgg	ataatggaat	gttgaatcca	1500
gaaggggaatg	tggggagtg	ccct	atgtta	gatccagcat	tagaggaagc	tccagcagta	1560
gatcctgtac	aagaaaaatt	ag	aaaaattt	acagctagtt	acggattagg	cttagatagt	1620
gttatattca	atatggatgg	aac	gattgaa	ttaagattgc	caagtggaga	agtgataaaa	1680
aagaatttat	ctgatttcat	agc	gaagctt	cgttatcggt	caaaccattg	ggtaccagat	1740
tcaagaccag	aagaaccaag	tcc	acaaccg	actccagaac	ctagtccaag	tccgcaacct	1800
gcaccaaate	ctcaaccagc	tcca	agcaat	ccaattgatg	agaaattggg	caaagaagct	1860
gttcgaaaag	taggcgatgg	ttat	gtcttt	gaggagaatg	gagtttctcg	ttatatccca	1920
gccagaatc	tttcagcaga	aac	agcagca	ggcattgata	gcaaactggc	caagcaggaa	1980
agtttatctc	ataagctagg	ag	ctaagaaa	actgacctcc	catctagtga	tcgagaattt	2040
tacaataagg	cttatgactt	act	agcaaga	attcaccaag	atttacttga	taataaaggt	2100
cgacaagttg	attttgaggc	ttt	ggataac	ctggttgaac	gactcaagga	tgtctcaagt	2160
gataaagtca	agttagtggg	tgat	atttctt	gccttcttag	ctccgattcg	tcattccagaa	2220
cgtttaggaa	aaccaaattgc	gca	aattacc	tacactgatg	atgagattca	agtagccaag	2280
ttggcaggca	agtacacaac	aga	agacgggt	tatatctttg	atcctcgtga	tataaccagt	2340
gatgaggggg	atgcctatgt	aact	ccacat	atgaccata	gccactggat	taaaaaagat	2400

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agtttgtctg aagctgagag agcggcagcc caggcttatg ctaaagagaa aggtttgacc 2460
cctccttcga cagaccatca ggattcagga aatactgagg caaaaggagc agaagctatc 2520
tacaaccgcg tgaaagcagc taagaagggtg ccacttgatc gtatgcctta caatcttcaa 2580
tatactgtag aagtcaaaaa cggtagttta atcatacctc attatgacca ttaccataac 2640
atcaaatttg agtggtttga cgaaggcctt tatgaggcac ctaaggggta tactcttgag 2700
gatcttttgg cgactgtcaa gtactatgtc gaacatccaa acgaacgtcc gcattcagat 2760
aatggttttg gtaacgctag cgaccatggt caaagaaaca aaaatgggtc agctgatacc 2820
aatcaaacgg aaaaaccaag cgaggagaaa cctcagacag aaaaacctga ggaagaaacc 2880
cctcgagaag agaaaccaca aagcgagaaa ccagagtctc caaaaccaac agaggaacca 2940
gaagaagaat caccagagga atcagaagaa cctcagggtc agactgaaaa ggttgaagaa 3000
aaactgagag aggttgaaga ttactttgga aaaatccagg atccaattat caagtccaat 3060
gccaaagaga ctctcacagg attaaaaaat aattttactat ttggcaccca ggacaacaat 3120
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<210> 77

<211> 473

<212> PRT

<213> S. pneumoniae

<400> 77

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Glu Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser
 1           5           10           15
Ser Tyr Asn Ala Asn Pro Val Gln Pro Arg Leu Ser Glu Asn His Asn
      20           25           30
Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser
      35           40           45
Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val
      50           55           60
Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr
      65           70           75           80
Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro
      85           90           95
Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro
      100          105          110
Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln
      115          120          125
Pro Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln Pro Ala
      130          135          140
Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val
      145          150          155          160
Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn
      165          170          175
Gly Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala
      180          185          190
Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys
      195          200          205
Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr
      210          215          220
Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp
      225          230          235          240
Asn Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp Asn Leu Leu Glu
      245          250          255
Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile
      260          265          270
Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro
      275          280          285

```

```

Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu
290                295                300
Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp
305                310                315                320
Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His
325                330                335
Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala
340                345                350
Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp
355                360                365
His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr
370                375                380
Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr
385                390                395                400
Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro
405                410                415
His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly
420                425                430
Leu Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr
435                440                445
Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn
450                455                460
Gly Phe Gly Asn Ala Ser Asp His Val
465                470

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<210> 78
<211> 780
<212> PRT
<213> S. pneumoniae

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<400> 78
Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu Asn Lys Asp Asn
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Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu
20     25     30
Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
35     40     45
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
50     55     60
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
65     70     75     80
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
85     90     95
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
100    105    110
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
115    120    125
Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
130    135    140
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
145    150    155    160
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
165    170    175
Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile
180    185    190
Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His
195    200    205

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Leu	Ala	Gly	Lys	Asn	Met	Gln	Pro	Ser	Gln	Leu	Ser	Tyr	Ser	Ser	Thr
210						215					220				
Ala	Ser	Asp	Asn	Asn	Thr	Gln	Ser	Val	Ala	Lys	Gly	Ser	Thr	Ser	Lys
225					230					235					240
Pro	Ala	Asn	Lys	Ser	Glu	Asn	Leu	Gln	Ser	Leu	Leu	Lys	Glu	Leu	Tyr
				245					250						255
Asp	Ser	Pro	Ser	Ala	Gln	Arg	Tyr	Ser	Glu	Ser	Asp	Gly	Leu	Val	Phe
			260				265						270		
Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro
		275					280					285			
His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	Ser	Lys	Leu	Ser	Ala	Leu
290						295					300				
Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr
305					310						315				320
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser
				325					330					335	
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser
			340					345					350		
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr
		355					360					365			
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro
		370				375					380				
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala
385				390						395					400
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys
				405					410					415	
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu
			420					425					430		
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe
		435					440					445			
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His
	450					455					460				
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser
465				470						475					480
His	Glu	Gln	Asp	Tyr	Pro	Gly	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp
			485						490					495	
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val
			500					505					510		
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr
		515					520					525			
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro
		530				535					540				
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu
545				550						555					560
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu
			565						570					575	
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln
			580					585					590		
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro
		595					600					605			
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile
	610					615					620				
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly
625				630						635					640
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu
			645						650					655	

Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu
			660					665					670		
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys
		675					680					685			
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr
	690					695					700				
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu
705					710					715					720
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn
			725					730					735		
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly
			740					745					750		
Thr	Thr	Arg	Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn
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	770					775					780				

<210> 79

<211> 690

<212> PRT

<213> S. pneumoniae

<400> 79

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		20						25					30		
Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala	Glu
		35						40					45		
Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	Gly
	50					55					60				
Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile	Ile
65				70						75					80
Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	Ser
			85					90					95		
Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn	Gly
			100					105					110		
Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg
		115					120					125			
Thr	Lys	Glu	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Ser	Gln	His	Arg
	130					135					140				
Glu	Gly	Gly	Thr	Ser	Ala	Asn	Asp	Gly	Ala	Val	Ala	Phe	Ala	Arg	Ser
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Gln	Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp
			165					170						175	
Ile	Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asp	His
		180						185					190		
Tyr	His	Tyr	Ile	Pro	Lys	Asn	Glu	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala
		195					200					205			
Ala	Glu	Ala	Phe	Leu	Ser	Gly	Arg	Glu	Asn	Leu	Ser	Asn	Leu	Arg	Thr
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Tyr	Arg	Arg	Gln	Asn	Ser	Asp	Asn	Thr	Pro	Arg	Thr	Asn	Trp	Val	Pro
225				230						235					240
Ser	Val	Ser	Asn	Pro	Gly	Thr	Thr	Asn	Thr	Asn	Thr	Ser	Asn	Asn	Ser
			245						250					255	
Asn	Thr	Asn	Ser	Gln	Ala	Ser	Gln	Ser	Asn	Asp	Ile	Asp	Ser	Leu	Leu
			260					265						270	

Lys	Gln	Leu	Tyr	Lys	Leu	Pro	Leu	Ser	Gln	Arg	His	Val	Glu	Ser	Asp	275	280	285
Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala	Arg	Gly	290	295	300
Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	Tyr	Glu	Gln	305	310	315
Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro	Leu	Arg	Tyr	325	330	335
Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu	Pro	Ser	Pro	340	345	350
Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	355	360	365
Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	370	375	380
Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Asn	Gly	Val	Ser		385	390	395
Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	405	410	415
Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Ala	420	425	430
Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	435	440	445
Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	450	455	460
Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	465	470	475
Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu	Ala	Phe	485	490	495
Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ala	Gln	500	505	510
Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	515	520	525
Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	530	535	540
Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	545	550	555
Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	565	570	575
Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	580	585	590
Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	595	600	605
Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	610	615	620
Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	625	630	635
His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	645	650	655
Ala	Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	660	665	670
Tyr	Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly	Phe	Gly	675	680	685
Asn	Ala															690		

20

2

Ala	Thr	His	Ile	Gly	Ser	Tyr	Gln	Leu	Gly	Lys	His	His	Met	Gly	Leu	20	25	30
Ala	Thr	Lys	Asp	Asn	Gln	Ile	Ala	Tyr	Ile	Asp	Asp	Ser	Lys	Gly	Lys	35	40	45
Ala	Lys	Ala	Pro	Lys	Thr	Asn	Lys	Thr	Met	Asp	Gln	Ile	Ser	Ala	Glu	50	55	60
Glu	Gly	Ile	Ser	Ala	Glu	Gln	Ile	Val	Val	Lys	Ile	Thr	Asp	Gln	Gly	65	70	75
Tyr	Val	Thr	Ser	His	Gly	Asp	His	Tyr	His	Phe	Tyr	Asn	Gly	Lys	Val	85	90	95
Pro	Tyr	Asp	Ala	Ile	Ile	Ser	Glu	Glu	Leu	Leu	Met	Thr	Asp	Pro	Asn	100	105	110
Tyr	Arg	Phe	Lys	Gln	Ser	Asp	Val	Ile	Asn	Glu	Ile	Leu	Asp	Gly	Tyr	115	120	125
Val	Ile	Lys	Val	Asn	Gly	Asn	Tyr	Tyr	Val	Tyr	Leu	Lys	Pro	Gly	Ser	130	135	140
Lys	Arg	Lys	Asn	Ile	Arg	Thr	Lys	Gln	Gln	Ile	Ala	Glu	Gln	Val	Ala	145	150	155
Lys	Gly	Thr	Lys	Glu	Ala	Lys	Glu	Lys	Gly	Leu	Ala	Gln	Val	Ala	His	165	170	175
Leu	Ser	Lys	Glu	Glu	Val	Ala	Ala	Val	Asn	Glu	Ala	Lys	Arg	Gln	Gly	180	185	190
Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Ser	Pro	Thr	Asp	Ile	Ile	195	200	205
Asp	Asp	Leu	Gly	Asp	Ala	Tyr	Leu	Val	Pro	His	Gly	Asn	His	Tyr	His	210	215	220
Tyr	Ile	Pro	Lys	Lys	Asp	Leu	Ser	Pro	Ser	Glu	Leu	Ala	Ala	Ala	Gln	225	230	235
Ala	Tyr	Trp	Ser	Gln	Lys	Gln	Gly	Arg	Gly	Ala	Arg	Pro	Ser	Asp	Tyr	245	250	255
Arg	Pro	Thr	Pro	Ala	Pro	Gly	Arg	Arg	Lys	Ala	Pro	Ile	Pro	Asp	Val	260	265	270
Thr	Pro	Asn	Pro	Gly	Gln	Gly	His	Gln	Pro	Asp	Asn	Gly	Gly	Tyr	His	275	280	285
Pro	Ala	Pro	Pro	Arg	Pro	Asn	Asp	Ala	Ser	Gln	Asn	Lys	His	Gln	Arg	290	295	300
Asp	Glu	Phe	Lys	Gly	Lys	Thr	Phe	Lys	Glu	Leu	Leu	Asp	Gln	Leu	His	305	310	315
Arg	Leu	Asp	Leu	Lys	Tyr	Arg	His	Val	Glu	Glu	Asp	Gly	Leu	Ile	Phe	325	330	335
Glu	Pro	Thr	Gln	Val	Ile	Lys	Ser	Asn	Ala	Phe	Gly	Tyr	Val	Val	Pro	340	345	350
His	Gly	Asp	His	Tyr	His	Ile	Ile	Pro	Arg	Ser	Gln	Leu	Ser	Pro	Leu	355	360	365
Glu	Met	Glu	Leu	Ala	Asp	Arg	Tyr	Leu	Ala	Gly	Gln	Thr	Glu	Asp	Asn	370	375	380
Asp	Ser	Gly	Ser	Glu	His	Ser	Lys	Pro	Ser	Asp	Lys	Glu	Val	Thr	His	385	390	395
Thr	Phe	Leu	Gly	His	Arg	Ile	Lys	Ala	Tyr	Gly	Lys	Gly	Leu	Asp	Gly	405	410	415
Lys	Pro	Tyr	Asp	Thr	Ser	Asp	Ala	Tyr	Val	Phe	Ser	Lys	Glu	Ser	Ile	420	425	430
His	Ser	Val	Asp	Lys	Ser	Gly	Val	Thr	Ala	Lys	His	Gly	Asp	His	Phe	435	440	445
His	Tyr	Ile	Gly	Phe	Gly	Glu	Leu	Glu	Gln	Tyr	Glu	Leu	Asp	Glu	Val	450	455	460

Ala Asn Trp Val Lys Ala Lys Gly Gln Ala Asp Glu Leu Ala Ala Ala
 465 470 475 480
 Leu Asp Gln Glu Gln Gly Lys Glu Lys Pro Leu Phe Asp Thr Lys Lys
 485 490 495
 Val Ser Arg Lys Val Thr Lys Asp Gly Lys Val Gly Tyr Met Met Pro
 500 505 510
 Lys Asp Gly Lys Asp Tyr Phe Tyr Ala Arg Asp Gln Leu Asp Leu Thr
 515 520 525
 Gln Ile Ala Phe Ala Glu Gln Glu Leu Met Leu Lys Asp Lys Lys His
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 Tyr Arg Tyr Asp Ile Val Asp Thr Gly Ile Glu Pro Arg Leu Ala Val
 545 550 555 560
 Asp Val Ser Ser Leu Pro Met His Ala Gly Asn Ala Thr Tyr Asp Thr
 565 570 575
 Gly Ser Ser Phe Val Ile Pro His Ile Asp His Ile His Val Val Pro
 580 585 590
 Tyr Ser Trp Leu Thr Arg Asp Gln Ile Ala Thr Val Lys Tyr Val Met
 595 600 605
 Gln His Pro Glu Val Arg Pro Asp Val Trp Ser Lys Pro Gly His Glu
 610 615 620
 Glu Ser Gly Ser Val Ile Pro Asn Val Thr Pro Leu Asp Lys Arg Ala
 625 630 635 640
 Gly Met Pro Asn Trp Gln Ile Ile His Ser Ala Glu Glu Val Gln Lys
 645 650 655
 Ala Leu Ala Glu Gly Arg Phe Ala Thr Pro Asp Gly Tyr Ile Phe Asp
 660 665 670
 Pro Arg Asp Val Leu Ala Lys Glu Thr Phe Val Trp Lys Asp Gly Ser
 675 680 685
 Phe Ser Ile Pro Arg Ala Asp Gly Ser Ser Leu Arg Thr Ile Asn Lys
 690 695 700
 Ser Asp Leu Ser Gln Ala Glu Trp Gln Gln Ala Gln Glu Leu Leu Ala
 705 710 715 720
 Lys Lys Asn Thr Gly Asp Ala Thr Asp Thr Asp Lys Pro Lys Glu Lys
 725 730 735
 Gln Gln Ala Asp Lys Ser Asn Glu Asn Gln Gln Pro Ser Glu Ala Ser
 740 745 750
 Lys Glu Glu Lys Glu Ser Asp Asp Phe Ile Asp Ser Leu Pro Asp Tyr
 755 760 765
 Gly Leu Asp Arg Ala Thr Leu Glu Asp His Ile Asn Gln Leu Ala Gln
 770 775 780
 Lys Ala Asn Ile Asp Pro Lys Tyr Leu Ile Phe Gln Pro Glu Gly Val
 785 790 795 800
 Gln Phe Tyr Asn Lys Asn Gly Glu Leu Val Thr Tyr Asp Ile Lys Thr
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 820

<210> 82

<211> 2472

<212> DNA

<213> S. pneumoniae

<400> 82

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<211> 824

<212> PRT

<213> S. pneumoniae

<400> 83

Val	Lys	Lys	Thr	Tyr	Gly	Tyr	Ile	Gly	Ser	Val	Ala	Ala	Ile	Leu	Leu
1				5				10						15	
Ala	Thr	His	Ile	Gly	Ser	Tyr	Gln	Leu	Gly	Lys	His	His	Met	Gly	Leu
			20					25					30		
Ala	Thr	Lys	Asp	Asn	Gln	Ile	Ala	Tyr	Ile	Asp	Asp	Ser	Lys	Gly	Lys
		35					40					45			
Ala	Lys	Ala	Pro	Lys	Thr	Asn	Lys	Thr	Met	Asp	Gln	Ile	Ser	Ala	Glu
	50					55					60				
Glu	Gly	Ile	Ser	Ala	Glu	Gln	Ile	Val	Val	Lys	Ile	Thr	Asp	Gln	Gly
65					70					75				80	
Tyr	Val	Thr	Ser	His	Gly	Asp	His	Tyr	His	Phe	Tyr	Asn	Gly	Lys	Val
				85				90						95	

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Pro Tyr Asp Ala Ile Ile Ser Glu Glu Leu Leu Met Thr Asp Pro Asn
      100                      105                      110
Tyr His Phe Lys Gln Ser Asp Val Ile Asn Glu Ile Leu Asp Gly Tyr
      115                      120                      125
Val Ile Lys Val Asn Gly Asn Tyr Tyr Val Tyr Leu Lys Pro Gly Ser
      130                      135                      140
Lys Arg Lys Asn Ile Arg Thr Lys Gln Gln Ile Ala Glu Gln Val Ala
      145                      150                      155                      160
Lys Gly Thr Lys Glu Ala Lys Glu Lys Gly Leu Ala Gln Val Ala His
      165                      170                      175
Leu Ser Lys Glu Glu Val Ala Ala Val Asn Glu Ala Lys Arg Gln Gly
      180                      185                      190
Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Ser Pro Thr Asp Ile Ile
      195                      200                      205
Asp Asp Leu Gly Asp Ala Tyr Leu Val Pro His Gly Asn His Tyr His
      210                      215                      220
Tyr Ile Pro Lys Lys Asp Leu Ser Pro Ser Glu Leu Ala Ala Ala Gln
      225                      230                      235                      240
Ala Tyr Trp Ser Gln Lys Gln Gly Arg Gly Ala Arg Pro Ser Asp Tyr
      245                      250                      255
Arg Pro Thr Pro Ala Pro Gly Arg Arg Lys Ala Pro Ile Pro Asp Val
      260                      265                      270
Thr Pro Asn Pro Gly Gln Gly His Gln Pro Asp Asn Gly Gly Tyr His
      275                      280                      285
Pro Ala Pro Pro Arg Pro Asn Asp Ala Ser Gln Asn Lys His Gln Arg
      290                      295                      300
Asp Glu Phe Lys Gly Lys Thr Phe Lys Glu Leu Leu Asp Gln Leu His
      305                      310                      315                      320
Arg Leu Asp Leu Lys Tyr Arg His Val Glu Glu Asp Gly Leu Ile Phe
      325                      330                      335
Glu Pro Thr Gln Val Ile Lys Ser Asn Ala Phe Gly Tyr Val Val Pro
      340                      345                      350
His Gly Asp His Tyr His Ile Ile Pro Arg Ser Gln Leu Ser Pro Leu
      355                      360                      365
Glu Met Glu Leu Ala Asp Arg Tyr Leu Ala Gly Gln Thr Glu Asp Asn
      370                      375                      380
Asp Ser Gly Ser Asp His Ser Lys Pro Ser Asp Lys Glu Val Thr His
      385                      390                      395                      400
Thr Phe Leu Gly His Arg Ile Lys Ala Tyr Gly Lys Gly Leu Asp Gly
      405                      410                      415
Lys Pro Tyr Asp Thr Ser Asp Ala Tyr Val Phe Ser Lys Glu Ser Ile
      420                      425                      430
His Ser Val Asp Lys Ser Gly Val Thr Ala Lys His Gly Asp His Phe
      435                      440                      445
His Tyr Ile Gly Phe Gly Glu Leu Glu Gln Tyr Glu Leu Asp Glu Val
      450                      455                      460
Ala Asn Trp Val Lys Ala Lys Gly Gln Ala Asp Glu Leu Ala Ala Ala
      465                      470                      475                      480
Leu Asp Gln Glu Gln Gly Lys Glu Lys Pro Leu Phe Asp Thr Lys Lys
      485                      490                      495
Val Ser Arg Lys Val Thr Lys Asp Gly Lys Val Gly Tyr Ile Met Pro
      500                      505                      510
Lys Asp Gly Lys Asp Tyr Phe Tyr Ala Arg Asp Gln Leu Asp Leu Thr
      515                      520                      525
Gln Ile Ala Phe Ala Glu Gln Leu Met Leu Lys Asp Lys Asn His
      530                      535                      540

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Tyr Arg Tyr Asp Ile Val Asp Thr Gly Ile Glu Pro Arg Leu Ala Val
545                               550                               555                               560
Asp Val Ser Ser Leu Pro Met His Ala Gly Asn Ala Thr Tyr Asp Thr
                               565                               570                               575
Gly Ser Ser Phe Val Ile Pro His Ile Asp His Ile His Val Val Pro
                               580                               585                               590
Tyr Ser Trp Leu Thr Arg Asp Gln Ile Ala Thr Ile Lys Tyr Val Met
                               595                               600                               605
Gln His Pro Glu Val Arg Pro Asp Val Trp Ser Lys Pro Gly His Glu
                               610                               615                               620
Glu Ser Gly Ser Val Ile Pro Asn Val Thr Pro Leu Asp Lys Arg Ala
625                               630                               635                               640
Gly Met Pro Asn Trp Gln Ile Ile His Ser Ala Glu Glu Val Gln Lys
                               645                               650                               655
Ala Leu Ala Glu Gly Arg Phe Ala Thr Pro Asp Gly Tyr Ile Phe Asp
                               660                               665                               670
Pro Arg Asp Val Leu Ala Lys Glu Thr Phe Val Trp Lys Asp Gly Ser
                               675                               680                               685
Phe Ser Ile Pro Arg Ala Asp Gly Ser Ser Leu Arg Thr Ile Asn Lys
690                               695                               700
Ser Asp Leu Ser Gln Ala Glu Trp Gln Gln Ala Gln Glu Leu Leu Ala
705                               710                               715                               720
Lys Lys Asn Ala Gly Asp Ala Thr Asp Thr Asp Lys Pro Lys Glu Lys
                               725                               730                               735
Gln Gln Ala Asp Lys Ser Asn Glu Asn Gln Gln Pro Ser Glu Ala Ser
                               740                               745                               750
Lys Glu Glu Glu Lys Glu Ser Asp Asp Phe Ile Asp Ser Leu Pro Asp
755                               760                               765
Tyr Gly Leu Asp Arg Ala Thr Leu Glu Asp His Ile Asn Gln Leu Ala
770                               775                               780
Gln Lys Ala Asn Ile Asp Pro Lys Tyr Leu Ile Phe Gln Pro Glu Gly
785                               790                               795                               800
Val Gln Phe Tyr Asn Lys Asn Gly Glu Leu Val Thr Tyr Asp Ile Lys
                               805                               810                               815
Thr Leu Gln Gln Ile Asn Pro Pro
                               820

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<210> 84
<211> 1019
<212> PRT
<213> S. pneumoniae

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<400> 84
Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu Asn Lys Asp Asn
1                               5                               10                               15
Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu
20                               25                               30
Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
35                               40                               45
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
50                               55                               60
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
65                               70                               75                               80
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
85                               90                               95
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
100                               105                               110

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Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg	115	120	125
Thr	Lys	Asp	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Val	Lys	Asp	Asn	130	135	140
Glu	Lys	Val	Asn	Ser	Asn	Val	Ala	Val	Ala	Arg	Ser	Gln	Gly	Arg	Tyr	145	150	155
Thr	Thr	Asn	Asp	Gly	Tyr	Val	Phe	Asn	Pro	Ala	Asp	Ile	Ile	Glu	Asp	165	170	175
Thr	Gly	Asn	Ala	Tyr	Ile	Val	Pro	His	Arg	Gly	His	Tyr	His	Tyr	Ile	180	185	190
Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	Lys	Ala	His	195	200	205
Leu	Ala	Gly	Lys	Asn	Met	Gln	Pro	Ser	Gln	Leu	Ser	Tyr	Ser	Ser	Thr	210	215	220
Ala	Ser	Asp	Asn	Asn	Thr	Gln	Ser	Val	Ala	Lys	Gly	Ser	Thr	Ser	Lys	225	230	235
Pro	Ala	Asn	Lys	Ser	Glu	Asn	Leu	Gln	Ser	Leu	Leu	Lys	Glu	Leu	Tyr	245	250	255
Asp	Ser	Pro	Ser	Ala	Gln	Arg	Tyr	Ser	Glu	Ser	Asp	Gly	Leu	Val	Phe	260	265	270
Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro	275	280	285
His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	Ser	Lys	Leu	Ser	Ala	Leu	290	295	300
Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr	305	310	315
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser	325	330	335
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser	340	345	350
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr	355	360	365
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro	370	375	380
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala	385	390	395
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys	405	410	415
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu	420	425	430
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe	435	440	445
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His	450	455	460
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser	465	470	475
His	Glu	Gln	Asp	Tyr	Pro	Ser	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp	485	490	495
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val	500	505	510
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr	515	520	525
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro	530	535	540
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu	545	550	555
																		560

Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu	
				565					570					575		
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln	
			580					585					590			
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro	
		595					600					605				
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile	
	610					615					620					
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly	
625					630					635					640	
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu	
				645					650					655		
Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu	
			660					665					670			
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys	
		675					680					685				
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr	
	690					695				700						
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu	
705					710					715					720	
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn	
				725					730					735		
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly	
			740					745					750			
Thr	Thr	Arg	Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn	
		755				760						765				
Ala	Tyr	Leu	Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu	
	770					775					780					
Glu	Lys	Glu	Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys	
785					790					795					800	
Arg	Asn	Lys	Ala	Gln	Glu	Asn	Ser	Lys	Phe	Asp	Glu	Lys	Val	Glu	Glu	
				805					810					815		
Pro	Lys	Thr	Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly	
			820					825					830			
Asn	Ser	Thr	Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val	Pro	Thr	Val	Asp	Pro	
		835					840					845				
Val	Gln	Glu	Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu	
		850				855					860					
Glu	Asn	Val	Leu	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Tyr	Leu	Pro	
865					870					875					880	
Ser	Gly	Glu	Val	Ile	Lys	Lys	Asn	Met	Ala	Asp	Phe	Thr	Gly	Glu	Ala	
				885					890					895		
Pro	Gln	Gly	Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu	Asn	Gly	Lys	Val	Ser	
			900					905					910			
Thr	Gly	Thr	Val	Glu	Asn	Gln	Pro	Thr	Glu	Asn	Lys	Pro	Ala	Asp	Ser	
		915					920					925				
Leu	Pro	Glu	Ala	Pro	Asn	Glu	Lys	Pro	Val	Lys	Pro	Glu	Asn	Ser	Thr	
		930				935					940					
Asp	Asn	Gly	Met	Leu	Asn	Pro	Glu	Gly	Asn	Val	Gly	Ser	Asp	Pro	Met	
945					950					955					960	
Leu	Asp	Pro	Ala	Leu	Glu	Glu	Ala	Pro	Ala	Val	Asp	Pro	Val	Gln	Glu	
				965					970					975		
Lys	Leu	Glu	Lys	Phe	Thr	Ala	Ser	Tyr	Gly	Leu	Gly	Leu	Asp	Ser	Val	
			980					985					990			
Ile	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Arg	Leu	Pro	Ser	Gly	Glu	
		995					1000					1005				

Val Ile Lys Lys Asn Leu Ser Asp Leu Ile Ala
 1010 1015

<210> 85
 <211> 1019
 <212> PRT
 <213> S. pneumoniae

<400> 85
 Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu Asn Lys Asp Asn
 1 5 10 15
 Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu
 20 25 30
 Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
 35 40 45
 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
 50 55 60
 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
 65 70 75 80
 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
 85 90 95
 Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
 100 105 110
 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
 115 120 125
 Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
 130 135 140
 Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
 145 150 155 160
 Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
 165 170 175
 Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile
 180 185 190
 Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His
 195 200 205
 Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr
 210 215 220
 Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys
 225 230 235 240
 Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu Lys Glu Leu Tyr
 245 250 255
 Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe
 260 265 270
 Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro
 275 280 285
 His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu
 290 295 300
 Glu Glu Lys Ile Ala Arg Arg Val Pro Ile Ser Gly Thr Gly Ser Thr
 305 310 315 320
 Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser Ser Leu Gly Ser
 325 330 335
 Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys Glu Leu Ser Ser
 340 345 350
 Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile Val Glu Glu Thr
 355 360 365
 Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe His Tyr Ile Pro
 370 375 380

Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala	385	390	395	400
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Ile	Ser	His	Glu	Lys	405	410	415	
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu	420	425	430	
Asp	Glu	Ser	Gly	Phe	Ile	Met	Ser	His	Gly	Asn	His	Asn	His	Tyr	Phe	435	440	445	
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His	450	455	460	
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser	465	470	475	480
His	Glu	Gln	Asp	Tyr	Pro	Gly	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp	485	490	495	
Lys	Lys	Ile	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val		500	505	510	
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr	515	520	525	
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro	530	535	540	
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu	545	550	555	560
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu	565	570	575	
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln	580	585	590	
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro	595	600	605	
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile	610	615	620	
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly	625	630	635	640
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu	645	650	655	
Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu	660	665	670	
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys	675	680	685	
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr	690	695	700	
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu	705	710	715	720
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn	725	730	735	
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly	740	745	750	
Thr	Thr	Arg	Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn	755	760	765	
Ala	Tyr	Leu	Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu	770	775	780	
Glu	Lys	Glu	Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys	785	790	795	800
Arg	Asn	Lys	Ala	Gln	Glu	Asn	Ser	Lys	Leu	Asp	Glu	Lys	Val	Glu	Glu	805	810	815	
Pro	Lys	Thr	Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly	820	825	830	

Asn	Ser	Thr	Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val	Pro	Thr	Val	Asp	Pro
		835					840					845			
Val	Gln	Glu	Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu
	850					855					860				
Glu	Asn	Val	Leu	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Tyr	Leu	Pro
865					870					875					880
Ser	Gly	Glu	Val	Ile	Lys	Lys	Asn	Met	Ala	Asp	Phe	Thr	Gly	Glu	Ala
				885					890					895	
Pro	Gln	Gly	Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu	Asn	Gly	Lys	Val	Ser
		900						905					910		
Thr	Gly	Thr	Val	Glu	Asn	Gln	Pro	Thr	Glu	Asn	Lys	Pro	Ala	Asp	Ser
	915						920					925			
Leu	Pro	Glu	Ala	Pro	Asn	Glu	Lys	Pro	Val	Lys	Pro	Glu	Asn	Ser	Thr
	930					935					940				
Asp	Asn	Gly	Met	Leu	Asn	Pro	Glu	Gly	Asn	Val	Gly	Ser	Asp	Pro	Met
945					950					955					960
Leu	Asp	Pro	Ala	Leu	Glu	Glu	Ala	Pro	Ala	Val	Asp	Pro	Val	Gln	Glu
			965						970					975	
Lys	Leu	Glu	Lys	Phe	Thr	Ala	Ser	Tyr	Gly	Leu	Gly	Leu	Asp	Ser	Val
			980					985					990		
Ile	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Arg	Leu	Pro	Ser	Gly	Glu
		995					1000					1005			
Val	Ile	Lys	Lys	Asn	Leu	Ser	Asp	Leu	Ile	Ala					
	1010					1015									

<210> 86

<211> 1019

<212> PRT

<213> S. pneumoniae

<400> 86

Cys	Ala	Tyr	Ala	Leu	Asn	Gln	His	Arg	Ser	Gln	Glu	Asn	Lys	Asp	Asn
1				5					10					15	
Asn	Arg	Val	Ser	Tyr	Val	Asp	Gly	Ser	Gln	Ser	Ser	Gln	Lys	Ser	Glu
		20						25					30		
Asn	Leu	Thr	Pro	Asp	Gln	Val	Ser	Gln	Lys	Glu	Gly	Ile	Gln	Ala	Glu
		35					40					45			
Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	Gly
	50					55					60				
Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Leu	Phe
65					70					75					80
Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	Ala
				85					90					95	
Asp	Ile	Val	Asn	Glu	Val	Lys	Gly	Gly	Tyr	Ile	Ile	Lys	Val	Asp	Gly
			100					105					110		
Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg
		115					120					125			
Thr	Lys	Asp	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Val	Lys	Asp	Asn
	130					135					140				
Glu	Lys	Val	Asn	Ser	Asn	Val	Ala	Val	Ala	Arg	Ser	Gln	Gly	Arg	Tyr
145					150					155					160
Thr	Thr	Asn	Asp	Gly	Tyr	Val	Phe	Asn	Pro	Ala	Asp	Ile	Ile	Glu	Asp
			165						170					175	
Thr	Gly	Asn	Ala	Tyr	Ile	Val	Pro	His	Gly	Gly	His	Tyr	His	Tyr	Ile
		180						185					190		
Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	Lys	Ala	His
		195					200					205			

Leu	Ala	Gly	Lys	Asn	Met	Gln	Pro	Ser	Gln	Leu	Ser	Tyr	Ser	Ser	Thr
210						215				220					
Ala	Ser	Asp	Asn	Asn	Thr	Gln	Ser	Val	Ala	Lys	Gly	Ser	Thr	Ser	Lys
225					230					235					240
Pro	Ala	Asn	Lys	Ser	Glu	Asn	Leu	Gln	Ser	Leu	Leu	Lys	Glu	Leu	Tyr
				245					250						255
Asp	Ser	Pro	Ser	Ala	Gln	Arg	Tyr	Ser	Glu	Ser	Asp	Gly	Leu	Val	Phe
			260				265						270		
Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro
		275					280					285			
His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	Ser	Lys	Leu	Ser	Ala	Leu
290						295					300				
Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr
305					310					315					320
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser
				325					330					335	
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser
			340					345					350		
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr
		355					360					365			
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro
		370				375					380				
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala
385					390					395					400
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys
				405					410					415	
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu
			420					425					430		
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe
		435					440					445			
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His
	450					455					460				
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser
465					470					475					480
His	Glu	Gln	Asp	Tyr	Pro	Ser	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp
			485						490					495	
Lys	Lys	Ile	Glu	Lys	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val
			500					505					510		
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr
		515					520					525			
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro
	530					535					540				
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu
545					550					555					560
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu
			565					570						575	
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln
			580					585					590		
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro
	595					600						605			
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile
	610					615					620				
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly
625					630					635					640
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu
			645						650					655	

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Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu
      660                      665                      670
Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
      675                      680                      685
Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr
      690                      695                      700
Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu
705                      710                      715                      720
Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn
      725                      730                      735
Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
      740                      745                      750
Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn
      755                      760                      765
Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu
      770                      775                      780
Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
785                      790                      795                      800
Arg Asn Lys Ala Gln Glu Asn Leu Lys Leu Asp Glu Lys Val Glu Glu
      805                      810                      815
Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly
      820                      825                      830
Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro
      835                      840                      845
Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu
      850                      855                      860
Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro
865                      870                      875                      880
Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
      885                      890                      895
Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser
      900                      905                      910
Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
      915                      920                      925
Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
930                      935                      940
Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
945                      950                      955                      960
Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu
      965                      970                      975
Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
      980                      985                      990
Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu
      995                      1000                      1005
Val Ile Lys Lys Asn Leu Ser Asp Leu Ile Ala
      1010                      1015

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<212> PRT
<213> S. pneumoniae

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Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu
      20                      25                      30

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Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
   35                               40                               45
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
   50                               55                               60
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
  65                               70                               75                               80
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
   85                               90                               95
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
  100                               105                               110
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
  115                               120                               125
Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
  130                               135                               140
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
  145                               150                               155                               160
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
  165                               170                               175
Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile
  180                               185                               190
Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His
  195                               200                               205
Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr
  210                               215                               220
Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys
  225                               230                               235                               240
Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu Lys Glu Leu Tyr
  245                               250                               255
Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe
  260                               265                               270
Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro
  275                               280                               285
His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu
  290                               295                               300
Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly Thr Gly Ser Thr
  305                               310                               315                               320
Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser Ser Leu Gly Ser
  325                               330                               335
Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys Glu Leu Ser Ser
  340                               345                               350
Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile Val Glu Glu Thr
  355                               360                               365
Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe His Tyr Ile Pro
  370                               375                               380
Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn Asn Ser Leu Ala
  385                               390                               395                               400
Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr Ser His Glu Lys
  405                               410                               415
His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg Ile Ile Ala Glu
  420                               425                               430
Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His Asn His Tyr Phe
  435                               440                               445
Phe Lys Lys Asp Leu Thr Glu Gln Ile Lys Ala Ala Gln Lys His
  450                               455                               460
Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser
  465                               470                               475                               480

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His	Glu	Gln	Asp	Tyr	Pro	Gly	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp		
				485					490					495			
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val		
			500					505					510				
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr		
		515					520					525					
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro		
	530					535					540						
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu		
545					550					555					560		
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu		
			565					570						575			
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln		
			580					585					590				
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro		
	595						600					605					
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile		
	610					615					620						
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly		
625					630					635					640		
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu		
			645					650						655			
Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu		
		660						665					670				
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys		
	675						680					685					
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr		
	690					695				700							
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu		
705					710					715					720		
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn		
			725					730						735			
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly		
		740						745					750				
Thr	Thr	Arg	Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn		
		755					760					765					
Ala	Tyr	Leu	Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu		
	770					775					780						
Glu	Lys	Glu	Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys		
785					790					795					800		
Arg	Asn	Lys	Ala	Gln	Glu	Asn	Ser	Lys	Leu	Asp	Glu	Lys	Val	Glu	Glu		
			805					810						815			
Pro	Lys	Thr	Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly		
		820						825					830				
Asn	Ser	Thr	Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val	Pro	Thr	Val	Asp	Pro		
		835					840					845					
Val	Gln	Glu	Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu		
	850					855					860						
Glu	Asn	Val	Leu	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Tyr	Leu	Pro		
865					870					875					880		
Ser	Gly	Glu	Val	Ile	Lys	Lys	Asn	Met	Ala	Asp	Phe	Thr	Gly	Glu	Ala		
			885					890						895			
Pro	Gln	Gly	Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu	Asn	Gly	Lys	Val	Ser		
		900						905						910			
Thr	Gly	Thr	Val	Glu	Asn	Gln	Pro	Thr	Glu	Asn	Lys	Pro	Ala	Asp	Ser		
		915					920						925				

Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
 930 935 940
 Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
 945 950 955 960
 Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu
 965 970 975
 Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
 980 985 990
 Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu
 995 1000 1005
 Val Ile Lys Lys Asn Leu Ser Asp Phe Ile Ala
 1010 1015

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<400> 88
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 Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu
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 35 40 45
 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
 50 55 60
 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
 65 70 75 80
 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
 85 90 95
 Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
 100 105 110
 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
 115 120 125
 Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
 130 135 140
 Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
 145 150 155 160
 Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
 165 170 175
 Thr Gly Asn Ala Tyr Ile Val Pro His Arg Gly His Tyr His Tyr Ile
 180 185 190
 Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His
 195 200 205
 Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr
 210 215 220
 Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys
 225 230 235 240
 Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu Lys Glu Leu Tyr
 245 250 255
 Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe
 260 265 270
 Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro
 275 280 285
 His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu
 290 295 300

Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr
305					310					315					320
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser
				325					330					335	
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser
			340					345					350		
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr
		355					360					365			
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro
	370					375					380				
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala
385					390					395					400
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys
				405					410					415	
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu
			420					425					430		
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe
		435					440					445			
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His
	450					455					460				
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser
465					470					475					480
His	Glu	Gln	Asp	Tyr	Pro	Ser	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp
			485					490						495	
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val
		500						505					510		
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr
	515						520					525			
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro
	530					535					540				
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu
545					550					555					560
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu
				565					570					575	
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln
		580						585					590		
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro
	595					600						605			
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile
	610					615					620				
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly
625					630					635					640
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu
				645					650					655	
Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu
			660					665					670		
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys
		675					680					685			
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr
	690					695					700				
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu
705					710					715					720
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn
				725					730					735	
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly
			740					745					750		

Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn
 755 760 765
 Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu
 770 775 780
 Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
 785 790 795 800
 Arg Asn Lys Ala Gln Glu Asn Ser Lys Phe Asp Glu Lys Val Glu Glu
 805 810 815
 Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly
 820 825 830
 Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro
 835 840 845
 Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu
 850 855 860
 Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro
 865 870 875 880
 Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
 885 890 895
 Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser
 900 905 910
 Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
 915 920 925
 Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
 930 935 940
 Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
 945 950 955 960
 Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu
 965 970 975
 Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
 980 985 990
 Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu
 995 1000 1005
 Val Ile Lys Lys Asn Leu Ser Asp Leu Ile Ala
 1010 1015

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 Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
 35 40 45
 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
 50 55 60
 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
 65 70 75 80
 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
 85 90 95
 Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
 100 105 110
 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
 115 120 125

Thr	Lys	Asp	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Val	Lys	Asp	Asn	130	135	140
Glu	Lys	Val	Asn	Ser	Asn	Val	Ala	Val	Ala	Arg	Ser	Gln	Gly	Arg	Tyr	145	150	155
Thr	Thr	Asn	Asp	Gly	Tyr	Val	Phe	Asn	Pro	Ala	Asp	Ile	Ile	Glu	Asp	165	170	175
Thr	Gly	Asn	Ala	Tyr	Ile	Val	Pro	His	Arg	Gly	His	Tyr	His	Tyr	Ile	180	185	190
Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	Lys	Ala	His	195	200	205
Leu	Ala	Gly	Lys	Asn	Met	Gln	Pro	Ser	Gln	Leu	Ser	Tyr	Ser	Ser	Thr	210	215	220
Ala	Ser	Asp	Asn	Asn	Thr	Gln	Ser	Val	Ala	Lys	Gly	Ser	Thr	Ser	Lys	225	230	235
Pro	Ala	Asn	Lys	Ser	Glu	Asn	Leu	Gln	Ser	Leu	Leu	Lys	Glu	Leu	Tyr	245	250	255
Asp	Ser	Pro	Ser	Ala	Gln	Arg	Tyr	Ser	Glu	Ser	Asp	Gly	Leu	Val	Phe	260	265	270
Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro	275	280	285
His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	Ser	Lys	Leu	Ser	Ala	Leu	290	295	300
Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr	305	310	315
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser	325	330	335
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser	340	345	350
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr	355	360	365
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro	370	375	380
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala	385	390	395
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys	405	410	415
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu	420	425	430
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe	435	440	445
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His	450	455	460
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser	465	470	475
His	Glu	Gln	Asp	Tyr	Pro	Ser	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp	485	490	495
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val	500	505	510
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr	515	520	525
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro	530	535	540
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu	545	550	555
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu	565	570	575

Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln
			580					585					590		
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro
		595					600					605			
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile
	610					615					620				
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly
625					630					635					640
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu
				645					650					655	
Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu
			660					665					670		
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys
		675					680					685			
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr
	690					695					700				
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu
705					710					715					720
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn
			725					730						735	
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly
			740					745					750		
Thr	Thr	Arg	Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn
		755					760					765			
Ala	Tyr	Leu	Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu
	770					775					780				
Glu	Lys	Glu	Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys
785					790					795					800
Arg	Asn	Lys	Ala	Gln	Glu	Asn	Ser	Lys	Phe	Asp	Glu	Lys	Val	Glu	Glu
			805						810					815	
Pro	Lys	Thr	Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly
			820					825					830		
Asn	Ser	Thr	Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val	Pro	Thr	Val	Asp	Pro
		835					840					845			
Val	Gln	Glu	Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu
		850				855					860				
Glu	Asn	Val	Leu	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Tyr	Leu	Pro
865					870					875					880
Ser	Gly	Glu	Val	Ile	Lys	Lys	Asn	Met	Ala	Asp	Phe	Thr	Gly	Glu	Ala
			885						890					895	
Pro	Gln	Gly	Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu	Asn	Gly	Lys	Val	Ser
			900					905					910		
Thr	Gly	Thr	Val	Glu	Asn	Gln	Pro	Thr	Glu	Asn	Lys	Pro	Ala	Asp	Ser
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Leu	Pro	Glu	Ala												

<210> 90
 <211> 819
 <212> PRT
 <213> S. pneumoniae

<400> 90
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 Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
 20 25 30
 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
 35 40 45
 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
 50 55 60
 Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
 65 70 75 80
 Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
 85 90 95
 Ser Asp Ile Val Asn Glu Ile Lys Gly Tyr Val Ile Lys Val Asp
 100 105 110
 Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
 115 120 125
 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser His Asn
 130 135 140
 His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg Ala Gln Gly
 145 150 155 160
 Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile
 165 170 175
 Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His
 180 185 190
 Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala Ala Glu
 195 200 205
 Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser
 210 215 220
 Tyr Asn Ala Asn Pro Val Gln Pro Arg Leu Ser Glu Asn His Asn Leu
 225 230 235 240
 Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser Ser
 245 250 255
 Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val Glu
 260 265 270
 Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala
 275 280 285
 Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr
 290 295 300
 Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro Leu
 305 310 315 320
 Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln Pro
 325 330 335
 Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln Pro Ala Pro
 340 345 350
 Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys
 355 360 365
 Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly
 370 375 380
 Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala
 385 390 395 400

Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu
 405 410 415
 Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn
 420 425 430
 Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn
 435 440 445
 Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp Asn Leu Leu Glu Arg
 450 455 460
 Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu
 465 470 475 480
 Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn
 485 490 495
 Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala
 500 505 510
 Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile
 515 520 525
 Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser
 530 535 540
 His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala
 545 550 555 560
 Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His
 565 570 575
 Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn
 580 585 590
 Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn
 595 600 605
 Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His
 610 615 620
 Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu
 625 630 635 640
 Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr Val
 645 650 655
 Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly
 660 665 670
 Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp
 675 680 685
 Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser Glu Pro Thr
 690 695 700
 His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser
 705 710 715 720
 Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu
 725 730 735
 Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu Asn
 740 745 750
 Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys
 755 760 765
 Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly
 770 775 780
 Leu Lys Ser Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser
 785 790 795 800
 Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln Pro Ala
 805 810 815
 Pro Ile Gln

<210> 91

<211> 820

<212> PRT

<213> S. pneumoniae

<400> 91

Cys	Ser	Tyr	Glu	Leu	Gly	Arg	His	Gln	Ala	Gly	Gln	Val	Lys	Lys	Glu
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Ser	Asn	Arg	Val	Ser	Tyr	Ile	Asp	Gly	Asp	Gln	Ala	Gly	Gln	Lys	Ala
			20					25					30		
Glu	Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala
		35					40					45			
Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His
	50					55					60				
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile
65					70					75					80
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp
				85					90					95	
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asp
			100					105					110		
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile
		115					120					125			
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn
	130					135						140			
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln
145					150					155					160
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile
			165					170						175	
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asp	His	Tyr
		180						185					190		
His	Tyr	Ile	Pro	Lys	Asn	Glu	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala
		195					200					205			
Glu	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser
	210					215					220				
Ser	Tyr	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn
225					230					235					240
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser
			245						250					255	
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val
			260					265					270		
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr
		275					280					285			
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro
	290					295					300				
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro
305					310					315					320
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln
			325						330					335	
Pro	Ser	Pro	Gln	Ser	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala
			340					345					350		
Pro	Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val
		355					360					365			
Lys	Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn
	370					375					380				
Gly	Val	Ser	Arg	Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala
385					390					395					400
Ala	Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys
			405						410					415	

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Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr
      420      425      430
Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp
      435      440      445
Asn Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu
      450      455      460
Arg Leu Lys Asp Val Pro Ser Asp Lys Val Lys Leu Val Asp Asp Ile
465      470      475      480
Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro
      485      490      495
Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu
      500      505      510
Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp
      515      520      525
Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His
530      535      540
Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala
545      550      555      560
Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp
      565      570      575
His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr
      580      585      590
Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr
      595      600      605
Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro
610      615      620
His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly
625      630      635      640
Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr
      645      650      655
Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn
      660      665      670
Gly Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Val Asp Gln
675      680      685
Asp Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser Glu Pro
690      695      700
Thr His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro
705      710      715      720
Ser Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu
      725      730      735
Glu Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu
      740      745      750
Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu
      755      760      765
Lys Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr
770      775      780
Gly Leu Lys Ser Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile
785      790      795      800
Ser Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln Pro
      805      810      815
Ala Pro Ile Gln
      820

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<210> 92

<211> 816

<212> PRT

<213> S. pneumoniae

<400> 92

Cys	Ser	Tyr	Glu	Leu	Gly	Arg	His	Gln	Ala	Gly	Gln	Asp	Lys	Lys	Glu
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Ser	Asn	Arg	Val	Ala	Tyr	Ile	Asp	Gly	Asp	Gln	Ala	Gly	Gln	Lys	Ala
			20					25					30		
Glu	Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala
		35					40					45			
Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His
	50					55					60				
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile
65					70					75					80
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp
				85					90					95	
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn
			100					105					110		
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile
		115					120					125			
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn
	130					135					140				
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln
145					150					155					160
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile
				165					170					175	
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asn	His	Phe
			180					185				190			
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala
		195					200					205			
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser
	210					215					220				
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn
225					230					235					240
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser
				245					250					255	
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val
			260					265					270		
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr
		275					280					285			
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro
	290					295					300				
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro
305					310					315					320
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln
				325					330					335	
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln
			340					345					350		
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val
		355					360					365			
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg
	370					375					380				
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp
385					390					395					400
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys
				405					410					415	
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr
			420					425					430		

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Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg
    435                                440                        445
Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp
    450                                455                        460
Val Ser Ser Asp Lys Val Lys Leu Val Glu Asp Ile Leu Ala Phe Leu
465                                470                        475                        480
Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ser Gln Ile
    485                                490                        495
Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
    500                                505                        510
Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
    515                                520                        525
Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
    530                                535                        540
Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Gln Ala Tyr
545                                550                        555                        560
Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Arg Asp Ser
    565                                570                        575
Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
    580                                585                        590
Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
    595                                600                        605
Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
    610                                615                        620
Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
625                                630                        635                        640
Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
    645                                650                        655
Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
    660                                665                        670
Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro
    675                                680                        685
Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu
    690                                695                        700
Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn
705                                710                        715                        720
Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu
    725                                730                        735
Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile
    740                                745                        750
Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp
    755                                760                        765
Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser
    770                                775                        780
Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val
785                                790                        795                        800
Asp Ser Leu Leu Ala Leu Leu Lys Lys Ser Gln Pro Ala Pro Ile Gln
    805                                810                        815

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<210> 93

<211> 816

<212> PRT

<213> S. pneumoniae

<400> 93

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Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Asp Lys Lys Glu
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Ser	Asn	Arg	Val	Ala	Tyr	Ile	Asp	Gly	Asp	Gln	Ala	Gly	Gln	Lys	Ala		
			20					25					30				
Glu	Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala		
		35					40					45					
Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His		
	50					55					60						
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile		
65					70					75					80		
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp		
				85				90						95			
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn		
			100					105					110				
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile		
	115						120					125					
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Arg	Gln	Glu	His	Ser	His	Asn		
	130					135					140						
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln		
145					150					155					160		
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile		
				165				170							175		
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asn	His	Phe		
			180					185					190				
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala		
	195						200					205					
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser		
	210				215						220						
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn		
225					230					235					240		
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser		
				245					250					255			
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val		
			260					265					270				
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr		
	275						280					285					
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro		
	290					295					300						
Tyr	Glu	Gln	Met	Ser	Glu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro			
305					310				315					320			
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln		
				325					330					335			
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln		
			340					345					350				
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val		
	355						360					365					
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg		
	370				375						380						
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp		
385					390					395					400		
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys		
				405					410					415			
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr		
			420					425					430				
Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg		
	435						440					445					
Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp		
	450					455					460						

Val Ser Ser Asp Lys Val Lys Leu Val Glu Asp Ile Leu Ala Phe Leu
 465 470 475 480
 Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ser Gln Ile
 485 490 495
 Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
 500 505 510
 Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
 515 520 525
 Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
 530 535 540
 Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala Tyr
 545 550 555 560
 Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp Ser
 565 570 575
 Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
 580 585 590
 Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
 595 600 605
 Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
 610 615 620
 Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
 625 630 635 640
 Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
 645 650 655
 Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
 660 665 670
 Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro
 675 680 685
 Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu
 690 695 700
 Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn
 705 710 715 720
 Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu
 725 730 735
 Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile
 740 745 750
 Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp
 755 760 765
 Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser
 770 775 780
 Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val
 785 790 795 800
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 805 810 815

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 Ser Asn Arg Val Ala Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
 20 25 30
 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
 35 40 45

Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	50	55	60
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile	65	70	75
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	85	90	95
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn	100	105	110
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile	115	120	125
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn	130	135	140
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln	145	150	155
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile	165	170	175
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	Arg	Gly	Asn	His	Phe	180	185	190
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	195	200	205
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser	210	215	220
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn	225	230	235
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser	245	250	255
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	Arg	Val	260	265	270
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	275	280	285
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	290	295	300
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro	305	310	315
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln	325	330	335
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln	340	345	350
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val	355	360	365
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg	370	375	380
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp	385	390	395
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys	405	410	415
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	420	425	430
Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg	435	440	445
Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp	450	455	460
Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Glu	Asp	Ile	Leu	Ala	Phe	Leu	465	470	475
Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ser	Gln	Ile	485	490	495

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Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
      500      505      510
Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
      515      520      525
Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
      530      535      540
Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala Tyr
545      550      555      560
Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp Ser
      565      570      575
Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
      580      585      590
Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
      595      600      605
Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
      610      615      620
Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
625      630      635      640
Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
      645      650      655
Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
      660      665      670
Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro
      675      680      685
Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu
      690      695      700
Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn
705      710      715      720
Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu
      725      730      735
Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile
      740      745      750
Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp
      755      760      765
Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser
      770      775      780
Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val
785      790      795      800
Asp Ser Leu Leu Ala Leu Leu Lys Lys Ser Gln Pro Ala Pro Ile Gln
      805      810      815

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<212> PRT
<213> S. pneumoniae

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Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
      20      25      30
Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
      35      40      45
Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
      50      55      60
Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
65      70      75      80

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Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
      85                      90                      95
Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp
      100                    105                    110
Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
      115                    120                    125
Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu Arg Ser His Asn
      130                    135                    140
His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg Ala Gln Gly
      145                    150                    155                    160
Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile
      165                    170                    175
Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His
      180                    185                    190
Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Gln
      195                    200                    205
Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser Ser
      210                    215                    220
His Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu Asn His Asn Leu
      225                    230                    235                    240
Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser Ser
      245                    250                    255
Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val Glu
      260                    265                    270
Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala
      275                    280                    285
Asn Gly Val Ala Val Pro His Gly Asp His Tyr His Phe Ile Pro Tyr
      290                    295                    300
Ser Gln Leu Ser Pro Leu Glu Glu Lys Leu Ala Arg Ile Ile Pro Leu
      305                    310                    315                    320
Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln Pro
      325                    330                    335
Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Pro Gln Pro Ala Pro
      340                    345                    350
Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys
      355                    360                    365
Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly
      370                    375                    380
Val Pro Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala
      385                    390                    395                    400
Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu
      405                    410                    415
Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn
      420                    425                    430
Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn
      435                    440                    445
Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg
      450                    455                    460
Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu
      465                    470                    475                    480
Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn
      485                    490                    495
Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala
      500                    505                    510
Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile
      515                    520                    525

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Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser
 530 535 540
 His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala
 545 550 555 560
 Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His
 565 570 575
 Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn
 580 585 590
 Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn
 595 600 605
 Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His
 610 615 620
 Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu
 625 630 635 640
 Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr Val
 645 650 655
 Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly
 660 665 670
 Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala
 675 680 685
 Asp Thr Asn Gln Thr Glu Lys Pro Asn Glu Glu Lys Pro Gln Thr Glu
 690 695 700
 Lys Pro Glu Glu Asp Lys Glu His Asp Glu Val Ser Glu Pro Thr His
 705 710 715 720
 Pro Glu Ser Asp Glu Lys Glu Asn His Val Gly Leu Asn Pro Ser Ala
 725 730 735
 Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu
 740 745 750
 Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu Tyr Ser
 755 760 765
 Val Ile Asn Ala Lys Ile Ala Glu Ala Glu Ala Leu Leu Glu Lys Val
 770 775 780
 Thr Asp Ser Ser Ile Arg Gln Asn Ala Val Glu Thr Leu Thr Gly Leu
 785 790 795 800
 Lys Ser Ser Leu Leu Glu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala
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 Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln Pro Ala Pro
 820 825 830
 Ile Gln

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 Ser Asn Arg Val Ala Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
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 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
 35 40 45
 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
 50 55 60
 Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
 65 70 75 80

Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp		
				85					90					95			
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn		
			100					105					110				
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile		
		115					120					125					
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn		
	130					135					140						
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln		
145					150					155					160		
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile		
			165					170						175			
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asn	His	Phe		
		180						185					190				
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala		
	195						200					205					
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser		
	210					215					220						
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn		
225					230					235					240		
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser		
			245						250					255			
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val		
		260						265					270				
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr		
	275						280					285					
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro		
	290					295					300						
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro		
305					310					315					320		
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln		
			325						330					335			
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln		
		340						345					350				
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val		
	355						360					365					
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg		
	370					375					380						
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp		
385					390					395					400		
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys		
			405						410					415			
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr		
		420						425					430				
Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg		
	435					440						445					
Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp		
	450					455					460						
Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Glu	Asp	Ile	Leu	Ala	Phe	Leu		
465					470					475					480		
Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ser	Gln	Ile		
			485						490					495			
Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	Tyr		
		500						505					510				
Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	Asp		
		515					520					525					

Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	Ile
530						535					540				
Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	Tyr
545				550					555						560
Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	Ser
				565					570					575	
Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	Lys
			580					585					590		
Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	Tyr
		595				600					605				
Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	His
610						615					620				
Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	Ala
625				630					635						640
Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	Tyr
				645				650						655	
Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly	Phe	Gly	Asn
			660					665					670		
Ala	Ser	Asp	His	Val	Arg	Lys	Asn	Lys	Ala	Asp	Gln	Asp	Ser	Lys	Pro
		675				680					685				
Asp	Glu	Asp	Lys	Gly	His	Asp	Glu	Val	Ser	Glu	Pro	Thr	His	Pro	Glu
690						695					700				
Ser	Asp	Glu	Lys	Glu	Asn	His	Ala	Gly	Leu	Asn	Pro	Ser	Ala	Asp	Asn
705				710						715					720
Leu	Tyr	Lys	Pro	Ser	Thr	Asp	Thr	Glu	Glu	Thr	Glu	Glu	Glu	Ala	Glu
				725				730						735	
Asp	Thr	Thr	Asp	Glu	Ala	Glu	Ile	Pro	Gln	Val	Glu	His	Ser	Val	Ile
			740					745					750		
Asn	Ala	Lys	Ile	Ala	Asp	Ala	Glu	Ala	Leu	Leu	Glu	Lys	Val	Thr	Asp
		755				760					765				
Pro	Ser	Ile	Arg	Gln	Asn	Ala	Met	Glu	Thr	Leu	Thr	Gly	Leu	Lys	Ser
	770				775						780				
Ser	Leu	Leu	Leu	Gly	Thr	Lys	Asp	Asn	Asn	Thr	Ile	Ser	Ala	Glu	Val
785				790						795					800
Asp	Ser	Leu	Leu	Ala	Leu	Leu	Lys	Glu	Ser	Lys					
				805					810						

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<213> S. pneumoniae

<400> 97

Cys	Ser	Tyr	Glu	Leu	Gly	Arg	His	Gln	Ala	Gly	Gln	Asp	Lys	Lys	Glu
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Ser	Asn	Arg	Val	Ala	Tyr	Ile	Asp	Gly	Asp	Gln	Ala	Gly	Gln	Lys	Ala
			20					25					30		
Glu	Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala
			35				40					45			
Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His
	50					55					60				
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile
65					70					75					80
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp
				85				90						95	
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Tyr	Val	Ile	Lys	Val	Asn	
			100					105					110		

Gly	Lys	Tyr	Tyr	Gly	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile	115	120	125
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn	130	135	140
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln	145	150	155
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile	165	170	175
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asn	His	Phe	180	185	190
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	195	200	205
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser	210	215	220
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn	225	230	235
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser	245	250	255
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val	260	265	270
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	275	280	285
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	290	295	300
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro	305	310	315
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln	325	330	335
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln	340	345	350
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val	355	360	365
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg	370	375	380
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp	385	390	395
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys	405	410	415
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	420	425	430
Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg	435	440	445
Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp	450	455	460
Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Glu	Asp	Ile	Leu	Ala	Phe	Leu	465	470	475
Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ser	Gln	Ile	485	490	495
Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	Tyr	500	505	510
Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	Asp	515	520	525
Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	Ile	530	535	540
Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	Tyr	545	550	555
																		560

Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	Ser		
				565					570					575			
Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	Lys		
			580					585					590				
Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	Tyr		
		595					600					605					
Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	His		
	610					615					620						
Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	Ala		
625					630				635					640			
Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	Tyr		
				645				650					655				
Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly	Phe	Gly	Asn		
			660					665					670				
Ala	Ser	Asp	His	Val	Arg	Lys	Asn	Lys	Ala	Asp	Gln	Asp	Ser	Lys	Pro		
		675					680					685					
Asp	Glu	Asp	Lys	Gly	His	Asp	Glu	Val	Ser	Glu	Pro	Thr	His	Pro	Glu		
	690					695					700						
Ser	Asp	Glu	Lys	Glu	Asn	His	Ala	Gly	Leu	Asn	Pro	Ser	Ala	Asp	Asn		
705					710					715				720			
Leu	Tyr	Lys	Pro	Ser	Thr	Asp	Thr	Glu	Glu	Thr	Glu	Glu	Glu	Ala	Glu		
				725				730					735				
Asp	Thr	Thr	Asp	Glu	Ala	Glu	Ile	Pro	Gln	Val	Glu	His	Ser	Val	Ile		
			740					745					750				
Asn	Ala	Lys	Ile	Ala	Asp	Ala	Glu	Ala	Leu	Leu	Glu	Lys	Val	Thr	Asp		
		755					760					765					
Pro	Ser	Ile	Arg	Gln	Asn	Ala	Met	Glu	Thr	Leu	Thr	Gly	Leu	Lys	Ser		
	770					775					780						
Ser	Leu	Leu	Leu	Gly	Thr	Lys	Asp	Asn	Asn	Thr	Ile	Ser	Ala	Glu	Val		
785					790					795				800			
Asp	Ser	Leu	Leu	Ala	Leu	Leu	Lys	Glu	Ser	Lys							
				805					810								

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Cys	Ser	Tyr	Glu	Leu	Gly	Arg	His	Gln	Ala	Gly	Gln	Asp	Lys	Lys	Glu		
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Ser	Asn	Arg	Val	Ala	Tyr	Ile	Asp	Gly	Asp	Gln	Ala	Gly	Gln	Lys	Ala		
			20					25					30				
Glu	Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala		
		35					40					45					
Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His		
	50					55					60						
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile		
65					70					75				80			
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp		
				85					90					95			
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn		
		100						105					110				
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile		
		115					120					125					
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn		
	130						135					140					

His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln
145					150					155					160
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile
				165					170					175	
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asn	His	Phe
			180					185					190		
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala
	195						200					205			
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser
	210					215					220				
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn
225					230					235					240
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser
				245					250					255	
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val
			260					265					270		
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr
		275					280						285		
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro
	290						295				300				
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro
305					310					315					320
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln
				325					330					335	
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln
			340					345					350		
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val
		355					360					365			
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg
	370					375					380				
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp
385					390					395					400
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys
				405					410					415	
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr
			420					425					430		
Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg
		435					440					445			
Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp
	450					455					460				
Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Glu	Asp	Ile	Leu	Ala	Phe	Leu
465					470					475					480
Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ser	Gln	Ile
				485					490					495	
Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	Tyr
			500					505					510		
Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	Asp
		515					520					525			
Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	Ile
	530					535					540				
Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	Tyr
545					550					555					560
Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	Ser
				565					570					575	
Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	Lys
			580					585					590		

Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	Tyr
		595					600					605			
Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	His
	610					615					620				
Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	Ala
625					630					635					640
Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	Tyr
				645					650					655	
Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly	Phe	Gly	Asn
			660					665					670		
Ala	Ser	Asp	His	Val	Arg	Lys	Asn	Lys	Ala	Asp	Gln	Asp	Ser	Lys	Pro
		675					680				685				
Asp	Glu	Asp	Lys	Gly	His	Asp	Glu	Val	Ser	Glu	Pro	Thr	His	Pro	Glu
	690					695					700				
Ser	Asp	Glu	Lys	Glu	Asn	His	Ala	Gly	Leu	Asn	Pro	Ser	Ala	Asp	Asn
705					710					715					720
Leu	Tyr	Lys	Pro	Ser	Thr	Asp	Thr	Glu	Glu	Thr	Glu	Glu	Glu	Ala	Glu
				725					730					735	
Asp	Thr	Thr	Asp	Glu	Ala	Glu	Ile	Pro	Gln	Val	Glu	His	Ser	Val	Ile
			740					745					750		
Asn	Ala	Lys	Ile	Ala	Asp	Ala	Glu	Ala	Leu	Leu	Glu	Lys	Val	Thr	Asp
		755					760					765			
Pro	Ser	Ile	Arg	Gln	Asn	Ala	Met	Glu	Thr	Leu	Thr	Gly	Leu	Lys	Ser
	770					775					780				
Ser	Leu	Leu	Leu	Gly	Thr	Lys	Asp	Asn	Asn	Thr	Ile	Ser	Ala	Glu	Val
785					790					795					800
Asp	Ser	Leu	Leu	Ala	Leu	Leu	Lys	Glu	Ser	Lys					
				805					810						

<210> 99
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<400> 99

Cys	Ser	Tyr	Glu	Leu	Gly	Arg	His	Gln	Ala	Gly	Gln	Val	Lys	Lys	Glu
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Ser	Asn	Arg	Val	Ser	Tyr	Ile	Asp	Gly	Asp	Gln	Ala	Gly	Gln	Lys	Ala
			20					25					30		
Glu	Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala
		35					40					45			
Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His
	50					55					60				
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile
65					70					75					80
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp
				85					90					95	
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asp
			100					105					110		
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile
		115					120					125			
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	Arg	Ser	His	Asn
	130					135					140				
His	Asn	Ser	Arg	Ala	Asp	Asn	Ala	Val	Ala	Ala	Ala	Arg	Ala	Gln	Gly
145					150					155					160
Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile	Ile
				165					170					175	

Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asp	His	Tyr	His	180	185	190
Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	Gln	195	200	205
Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser	Ser	210	215	220
His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn	Leu	225	230	235
Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser	Ser	245	250	255
Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val	Glu	260	265	270
Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala	275	280	285
Asn	Gly	Val	Ala	Val	Pro	His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	290	295	300
Ser	Gln	Leu	Ser	Pro	Leu	Glu	Glu	Lys	Leu	Ala	Arg	Ile	Ile	Pro	Leu	305	310	315
Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln	Pro	325	330	335
Ser	Pro	Gln	Ser	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	340	345	350
Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	355	360	365
Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	370	375	380
Val	Pro	Arg	Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	385	390	395
Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	405	410	415
Gly	Ala	Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	420	425	430
Lys	Ala	Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	435	440	445
Lys	Gly	Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	450	455	460
Leu	Lys	Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu	465	470	475
Ala	Phe	Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	485	490	495
Ala	Gln	Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	500	505	510
Gly	Lys	Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	515	520	525
Thr	Ser	Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	530	535	540
His	Trp	Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	545	550	555
Gln	Ala	Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	565	570	575
Gln	Asp	Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	580	585	590
Arg	Val	Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	595	600	605
Leu	Gln	Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	610	615	620

Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu
 625 630 635 640
 Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr Val
 645 650 655
 Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly
 660 665 670
 Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala
 675 680 685
 Asp Thr Asn Gln Thr Glu Lys Pro Asn Glu Glu Lys Pro Gln Thr Glu
 690 695 700
 Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys
 705 710 715 720
 Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu
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 Glu Ser Pro Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val
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 Lys Glu Lys Leu Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asn
 755 760 765
 Pro Ile Ile Lys Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn
 770 775 780
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 35 40 45
 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
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 Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
 65 70 75 80
 Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
 85 90 95
 Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn
 100 105 110
 Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
 115 120 125
 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu Arg Ser His Asn
 130 135 140
 His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Arg Ala Gln Gly
 145 150 155 160
 Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile
 165 170 175
 Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His
 180 185 190
 Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala Glu
 195 200 205

Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser	Ser
210						215					220				
Tyr	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn	Leu
225					230					235					240
Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser	Ser
				245					250					255	
Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val	Glu
			260					265					270		
Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala
	275						280					285			
Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	Tyr
	290					295					300				
Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro	Leu
305					310					315					320
Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu	Pro
				325					330					335	
Ser	Pro	Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro
			340					345					350		
Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val	Arg	Lys	Val
	355						360					365			
Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg	Tyr	Ile	Pro
	370					375					380				
Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp	Ser	Lys	Leu
385					390					395					400
Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Ala	Lys	Lys	Thr	Asp
				405					410					415	
Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	Asp	Leu	Leu
			420					425					430		
Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg	Gln	Val	Asp
	435						440					445			
Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp	Val	Ser	Ser
	450					455					460				
Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu	Ala	Phe	Leu	Ala	Pro	Ile
465					470					475					480
Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ala	Gln	Ile	Thr	Tyr	Thr
				485					490					495	
Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	Tyr	Thr	Thr	Glu
			500					505					510		
Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	Asp	Glu	Gly	Asp
	515						520					525			
Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	Ile	Lys	Lys	Asp
	530					535					540				
Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	Tyr	Ala	Lys	Glu
545					550					555					560
Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	Ser	Gly	Asn	Thr
				565					570					575	
Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	Lys	Ala	Ala	Lys
			580					585					590		
Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	Tyr	Thr	Val	Glu
	595						600					605			
Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	His	Tyr	His	Asn
	610					615					620				
Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	Ala	Pro	Lys	Gly
625					630					635					640
Tyr	Ser	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	Tyr	Val	Glu	His
				645					650					655	

Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp
 660 665 670
 His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr Asn Gln Thr Glu
 675 680 685
 Lys Pro Asn Glu Glu Lys Pro Gln Thr Glu Lys Pro Glu Glu Glu Thr
 690 695 700
 Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu Ser Pro Lys Pro
 705 710 715 720
 Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser Pro Glu Glu Ser
 725 730 735
 Glu Glu Pro Gln Val Glu Thr Glu Lys Val Lys Glu Lys Leu Arg Glu
 740 745 750
 Ala Glu Asp Leu Leu Gly Lys Ile Gln Asn Pro Ile Ile Lys Ser Asn
 755 760 765
 Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr
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 Leu Lys Glu Ser Lys
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 <212> PRT
 <213> S. pneumoniae

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 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
 35 40 45
 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
 50 55 60
 Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
 65 70 75 80
 Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
 85 90 95
 Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp
 100 105 110
 Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
 115 120 125
 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu Arg Ser His Asn
 130 135 140
 His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg Ala Gln Gly
 145 150 155 160
 Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile
 165 170 175
 Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asn His Phe His
 180 185 190
 Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Gln
 195 200 205
 Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser Ser
 210 215 220
 His Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu Asn His Asn Leu
 225 230 235 240

Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser	Ser		
				245					250					255			
Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val	Glu		
			260					265						270			
Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala		
		275					280						285				
Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	Tyr		
		290				295					300						
Ser	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro	Leu		
305					310					315					320		
Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln	Pro		
				325					330					335			
Ser	Pro	Gln	Ser	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Ser	Ala	Pro		
			340					345					350				
Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys		
		355					360					365					
Glu	Val	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Lys	Asn	Gly		
		370				375					380						
Val	Ser	Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala	Glu	Thr	Ala	Ala		
385					390					395					400		
Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu		
				405					410					415			
Gly	Ala	Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn		
			420					425					430				
Lys	Ala	Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn		
		435					440					445					
Lys	Gly	Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg		
	450				455					460							
Leu	Glu	Asp	Val	Pro	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu		
465				470						475					480		
Ala	Phe	Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn		
				485					490					495			
Ala	Gln	Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala		
			500					505					510				
Gly	Lys	Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile		
		515					520					525					
Thr	Ser	Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser		
		530				535					540						
His	Trp	Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala		
545				550						555					560		
Gln	Ala	Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His		
				565					570					575			
Gln	Asp	Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn		
			580					585					590				
Arg	Val	Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn		
		595					600					605					
Leu	Gln	Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His		
	610					615					620						
Tyr	Asp	His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu		
625				630						635					640		
Tyr	Glu	Ala	Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val		
				645					650					655			
Lys	Tyr	Tyr	Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly		
			660					665					670				
Phe	Gly	Asn	Ala	Ser	Asp	His	Val	Gln	Arg	Asn	Lys	Asn	Gly	Gln	Ala		
		675					680						685				

Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu
 690 695 700
 Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys
 705 710 715 720
 Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu
 725 730 735
 Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu
 740 745 750
 Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys
 755 760 765
 Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe
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 Ala Leu Leu Lys Glu Ser Lys
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<400> 102
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 Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala Glu
 35 40 45
 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
 50 55 60
 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile Ile
 65 70 75 80
 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ser
 85 90 95
 Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn Gly
 100 105 110
 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
 115 120 125
 Thr Lys Glu Glu Ile Asn Arg Gln Lys Gln Glu His Ser Gln His Arg
 130 135 140
 Glu Gly Gly Thr Ser Ala Asn Asp Gly Ala Val Ala Phe Ala Arg Ser
 145 150 155 160
 Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp
 165 170 175
 Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His
 180 185 190
 Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala
 195 200 205
 Ala Glu Ala Phe Leu Ser Gly Arg Glu Asn Leu Ser Asn Leu Arg Thr
 210 215 220
 Tyr Arg Arg Gln Asn Ser Asp Asn Thr Pro Arg Thr Asn Trp Val Pro
 225 230 235 240
 Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser Asn Asn Ser
 245 250 255
 Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp Ser Leu Leu
 260 265 270

Lys	Gln	Leu	Tyr	Lys	Leu	Pro	Leu	Ser	Gln	Arg	His	Val	Glu	Ser	Asp	275	280	285
Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala	Arg	Gly	290	295	300
Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	Tyr	Glu	Gln	305	310	315
Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro	Leu	Arg	Tyr	325	330	335
Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu	Pro	Ser	Pro	340	345	350
Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	355	360	365
Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	370	375	380
Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	385	390	395
Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	405	410	415
Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Ala	420	425	430
Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	435	440	445
Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	450	455	460
Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	465	470	475
Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu	Ala	Phe	485	490	495
Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ala	Gln	500	505	510
Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	515	520	525
Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	530	535	540
Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	545	550	555
Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	565	570	575
Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	580	585	590
Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	595	600	605
Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	610	615	620
Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	625	630	635
His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	645	650	655
Ala	Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	660	665	670
Tyr	Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly	Phe	Gly	675	680	685
Asn	Ala	Ser	Asp	His	Val	Gln	Arg	Asn	Lys	Asn	Gly	Gln	Ala	Asp	Thr	690	695	700
Asn	Gln	Thr	Glu	Lys	Pro	Ser	Glu	Glu	Lys	Pro	Gln	Thr	Glu	Lys	Pro	705	710	715
																		720

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Cont

Glu	Glu	Glu	Thr	Pro	Arg	Glu	Glu	Lys	Pro	Gln	Ser	Glu	Lys	Pro	Glu	
				725					730					735		
Ser	Pro	Lys	Pro	Thr	Glu	Glu	Pro	Glu	Glu	Glu	Ser	Pro	Glu	Glu	Ser	
			740					745					750			
Glu	Glu	Pro	Gln	Val	Glu	Thr	Glu	Lys	Val	Glu	Glu	Lys	Leu	Arg	Glu	
		755					760					765				
Ala	Glu	Asp	Leu	Leu	Gly	Lys	Ile	Gln	Asp	Pro	Ile	Ile	Lys	Ser	Asn	
	770					775					780					
Ala	Lys	Glu	Thr	Leu	Thr	Gly	Leu	Lys	Asn	Asn	Leu	Leu	Phe	Gly	Thr	
	785					790				795					800	
Gln	Asp	Asn	Asn	Thr	Ile	Met	Ala	Glu	Ala	Glu	Lys	Leu	Leu	Ala	Leu	
				805					810						815	
Leu	Lys	Glu	Ser	Lys												
				820												
